Analog and Digital Electronics Lab (EC13203)
IT-A1
Lab-1
(Lab Introduction/Software Introduction/Basic Gate verification)

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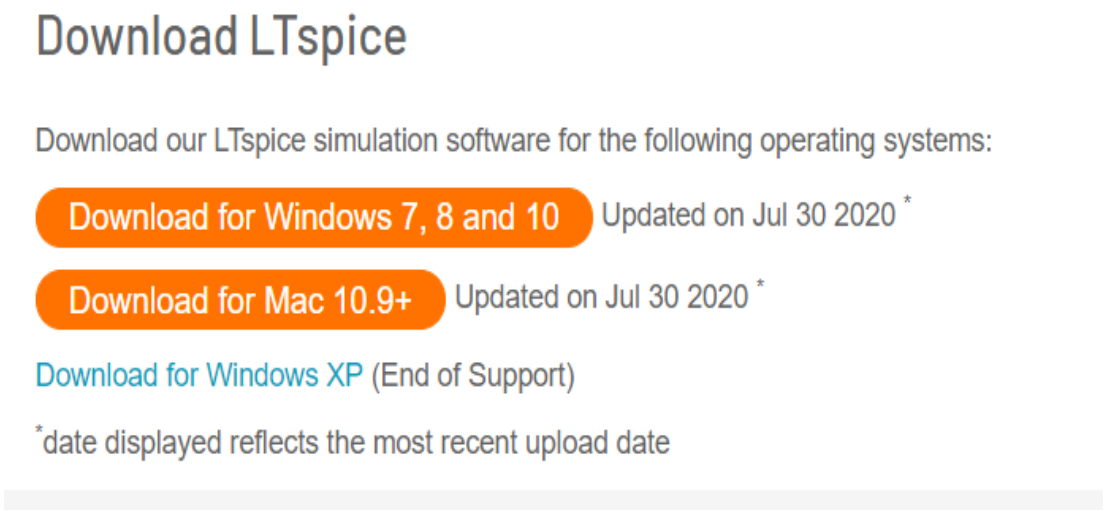
List of Experiments

1. Logic Gate verification using various ICs.
2. Realization of different logical gates by using NAND/NOR Logic.
3. Verification of Half-Adder & Full-Adder using basic gates.
4. Verification of Half-Subtractor & Full-Subtractor using basic gates.
5. Implement following code conversions:
   a) Binary to Gray b) Gray to Binary
6. Realization of 4x1 MUX using basic gates and implement Full Adder by using 4x1 MUX .
7. Realization of 3x8 Decoder using basic gates and implement Full Adder by using 3x8 Decoder .
8. Verify the truth-table of following Flip-Flops:
   a) SR Flip-Flop b) D Flip-Flop
9. Design Mod-8 Up/Down Counter.
10. Calculate amplitude and frequency of following waveforms on CRO:
    a) Sinusoidal b) Square c) Triangular
11. Verify the p-n junction diode characteristics under forward and reverse bias conditions.
12. Verify the Zener Diode characteristics.
13. Verify the rectify in Half-wave and Full-wave modes.
14. Verify the input/output characteristics of a BJT in CE configuration.

Installation of LTSpice

1. Visit the URL- https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html#
2. Click on download LTSpice simulation software as per your Operating System.



3. Now run the Installation file after the download gets completed.

4. Accept the license by clicking on license button.

5. Select the type of Executable Version 32bit or 64 bit.

6. Select the installation directory where you want the LTSpice to install.

7. Click on Install now button.

8. LTSpice will be installed into your system.

Experiment No.-1
Logic Gate verification using various ICs

Logic Gate ICs

- **AND Gate:**

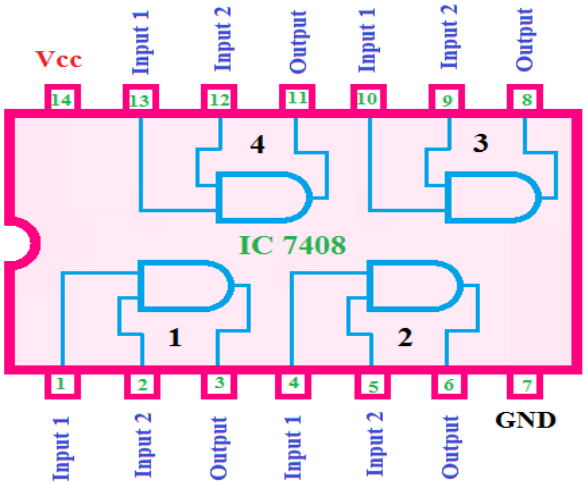
(a) Circuit symbol

A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

(b) Truth table

$C = A \cdot B$

(c) Boolean expression



- OR Gate:

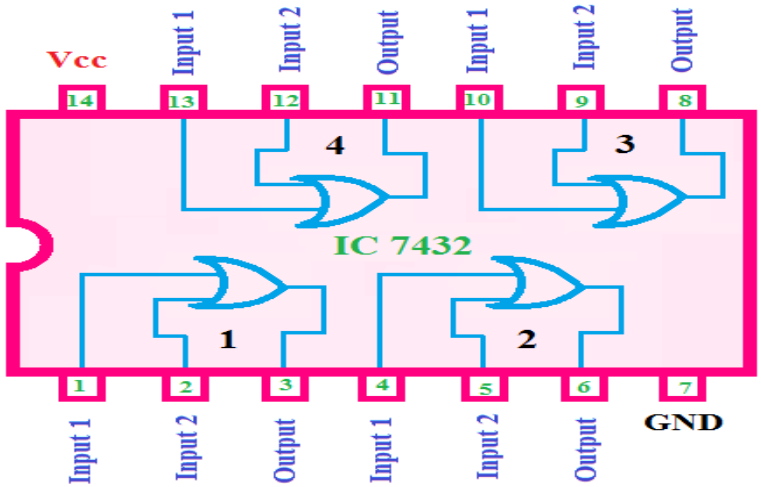
(a) Circuit symbol

A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

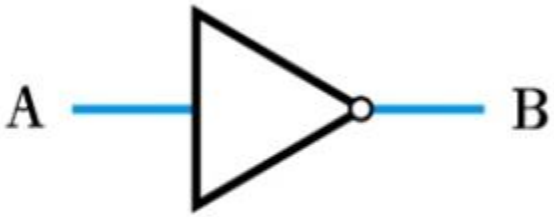
(b) Truth table

$C = A + B$

(c) Boolean expression



- NOT Gate:



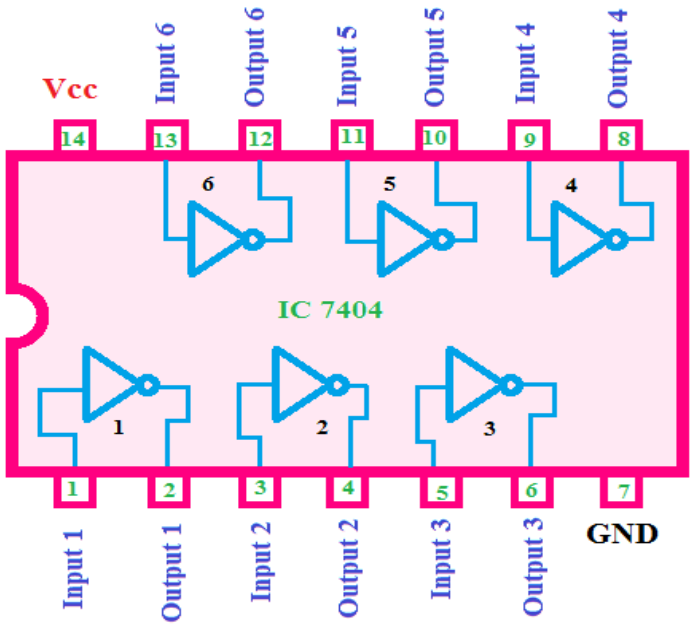
(a) Circuit symbol

A	B
0	1
1	0

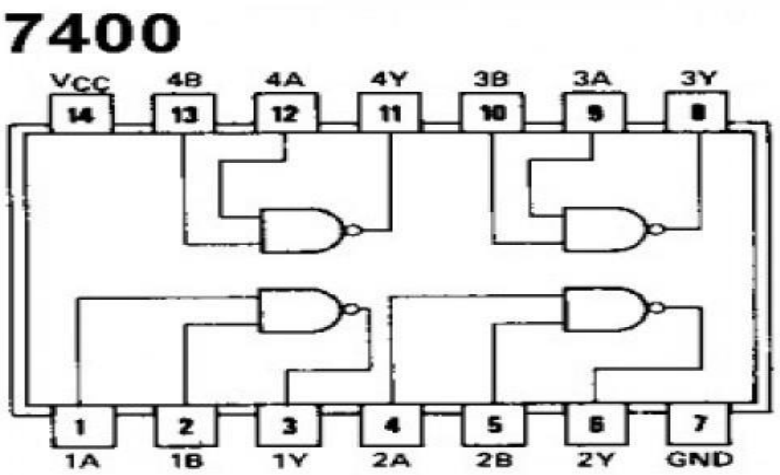
(b) Truth table

$B = \overline{A}$

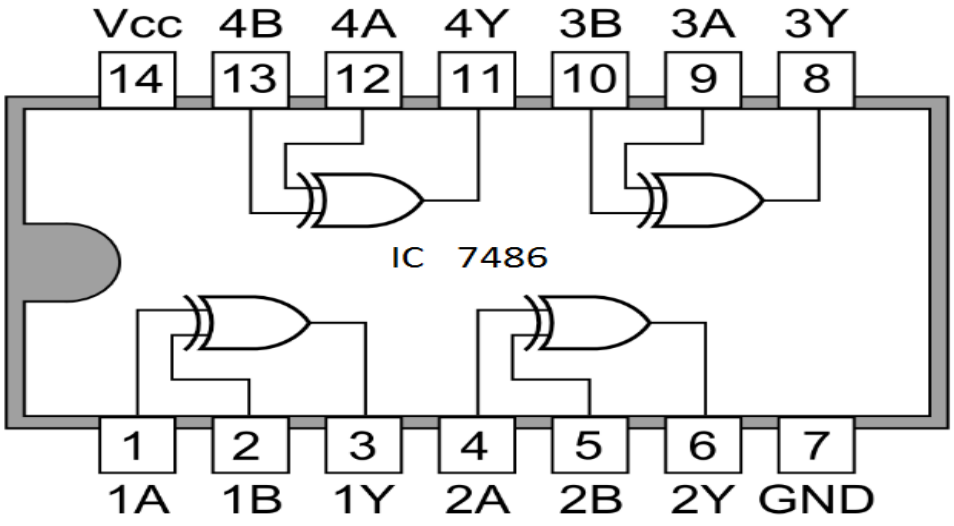
(c) Boolean expression



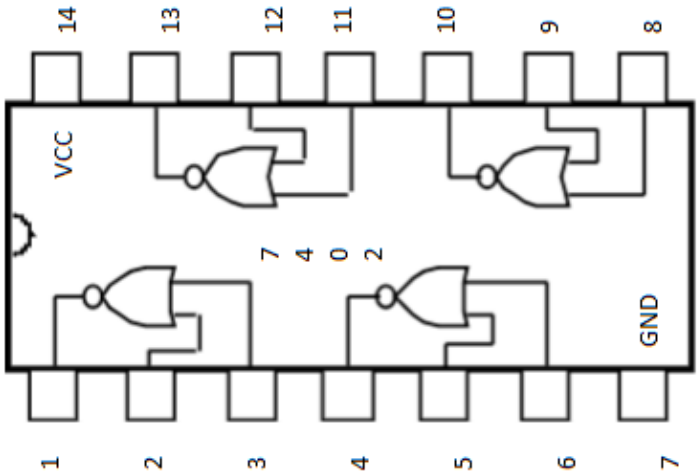
- NAND Gate:



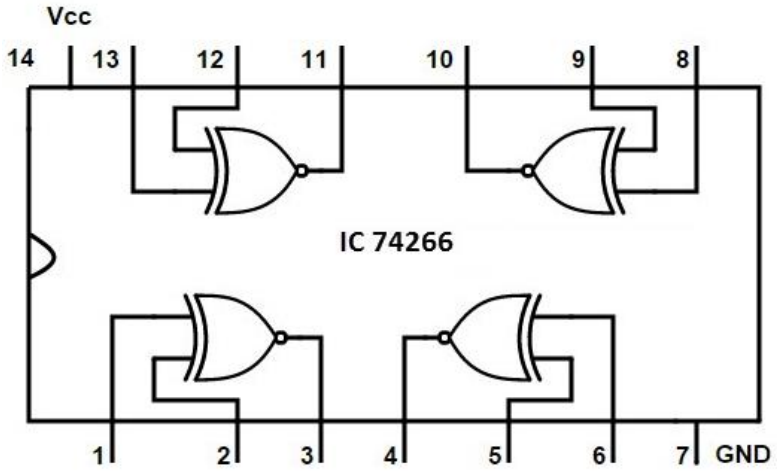
- EX-OR Gate:



- NOR Gate:



- EX-NOR Gate:



For Virtual Lab

- Use the following link:

http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/cool_developers/labs/

Format for File (Soft Copy)

- Aim
- Component Used
- Theory
- Procedure
- Circuit Diagram
- Output