

Electronics for Information Technology (IELe)

3rd lab

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Integrated circuits, logic functions

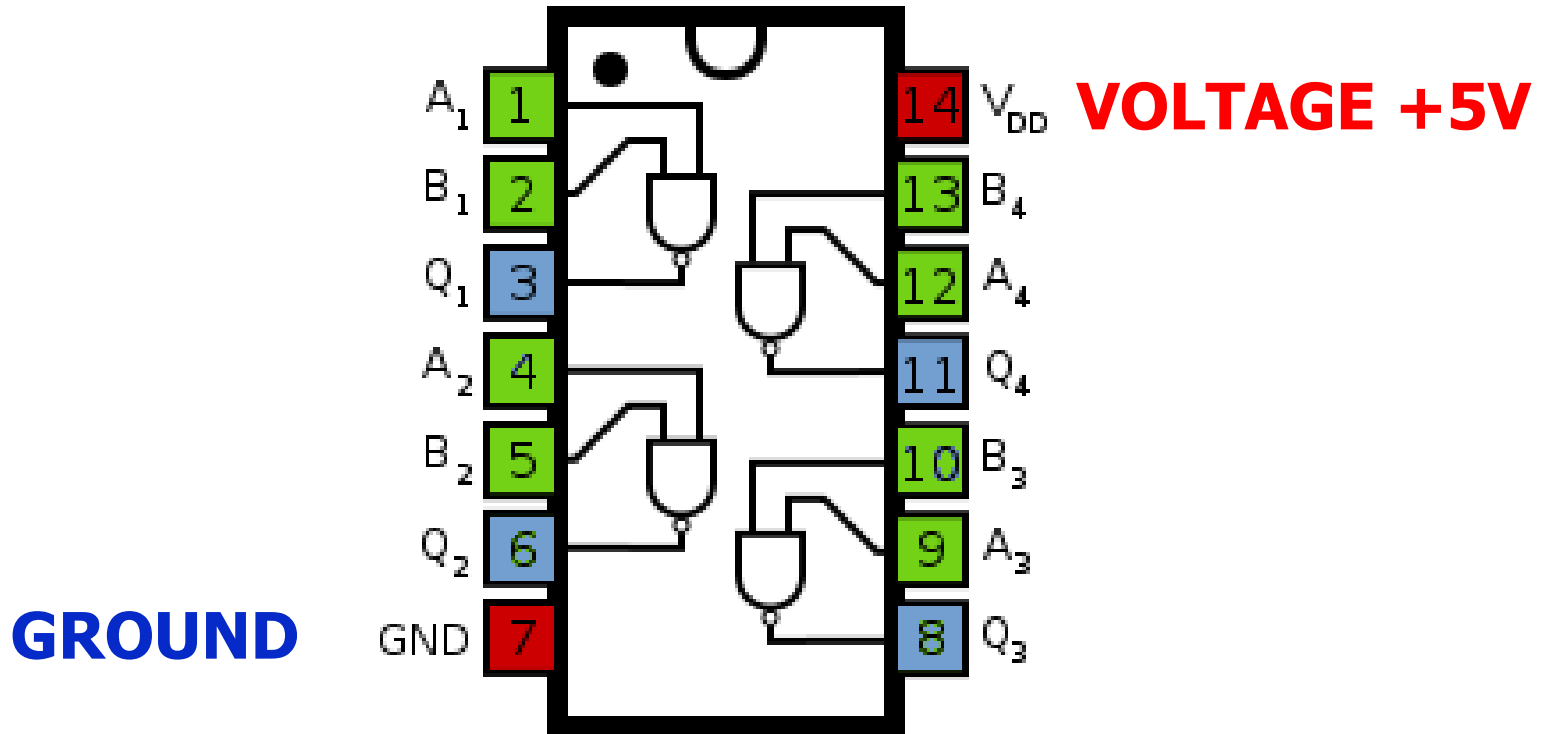
- Flip flops from **NAND** gates

EQUIPMENT



Integrated circuit – 4 NAND gates

- TTL integrated circuit (IO) – 4 x NAND



- Do not remove the integrated circuit from the solderless board



TASK 1: CHECK OF IO 7400

Set before the measurement



DCV
direct voltage

DCA
direct current

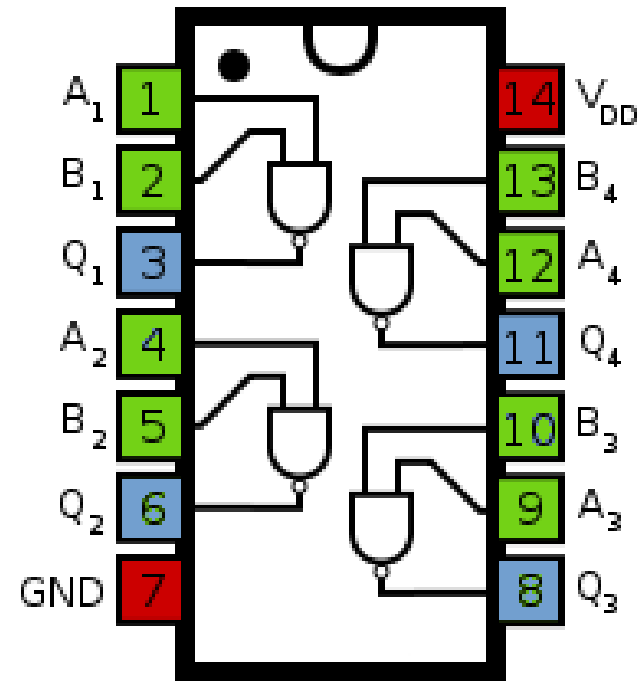
Ω
resistanc

Test wire

Ground (GND)

Measure (U, I, R)

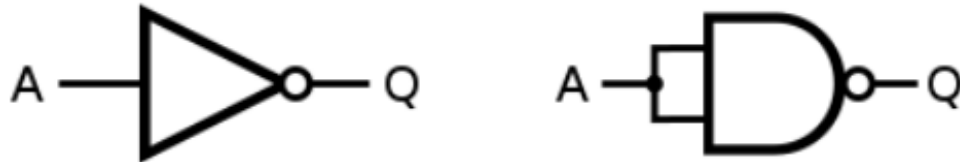
- Check the four NAND gates for all possible input combinations
- Voltages: **+5V (1)**, ground (GND): **0V (0)**
- Check using the **multimeter**
- **Guide for A1,B1 and Q1:**
 - A1: sequentially **5V, 0V**
 - B1: sequentially **5V, 0V**
 - Q1: connect the **multimetr (20V)**
 - **Log. 1:** $\geq 2,4 \text{ V}$
 - **Log. 0:** $\leq 0,4 \text{ V}$



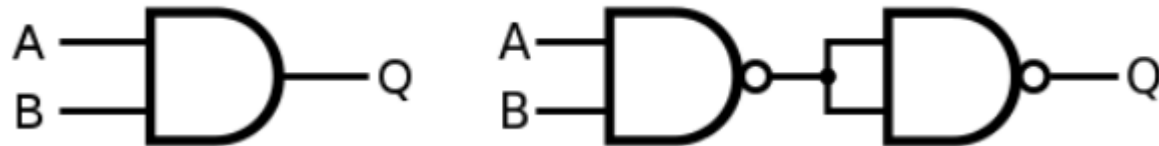
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

- NAND gate 

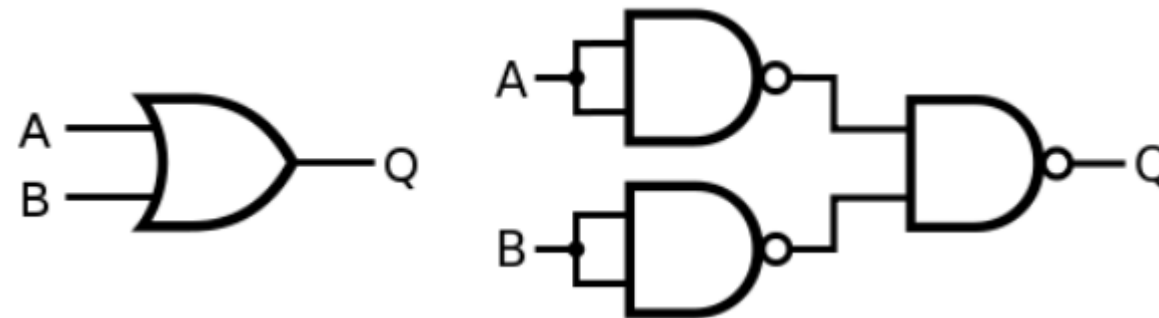
NOT



AND



OR

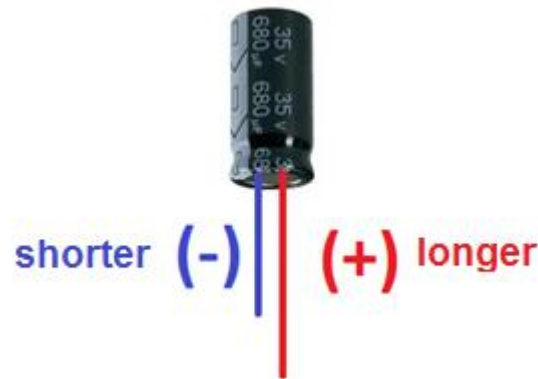


More logical functions:

https://en.wikipedia.org/wiki/NAND_logic

TASK 2: FLIP FLOPS FROM NAND GATES

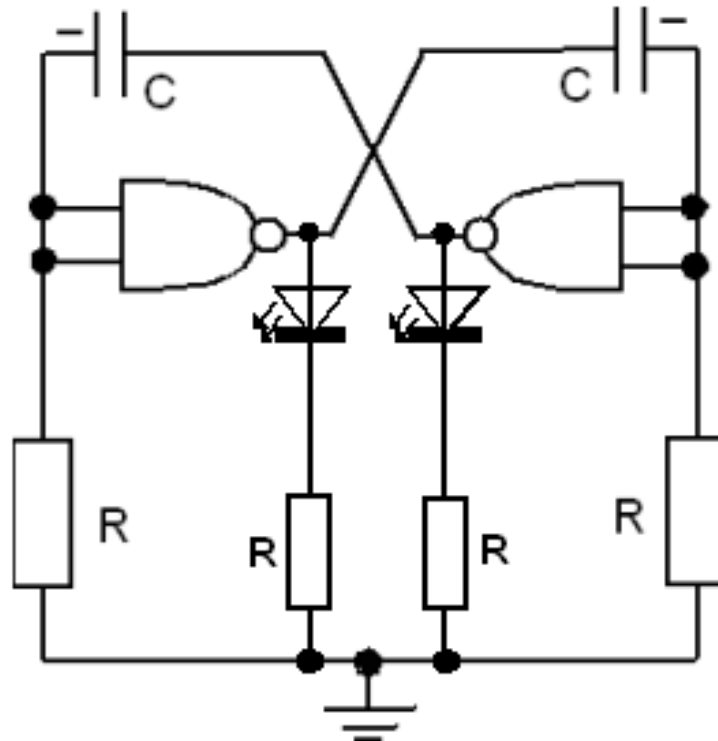
- **Capacitor**
 - Electrolytic
 - **If you connect it wrong, it might explode.**
- **The negative (-) electrode is connected to the ground (0V)**



- Connect NAND gates as NOTs



- And connect the circuit according to the scheme below



Thank you for your attention!