Lab. 01

Logic Design Lab.
Spring 2017
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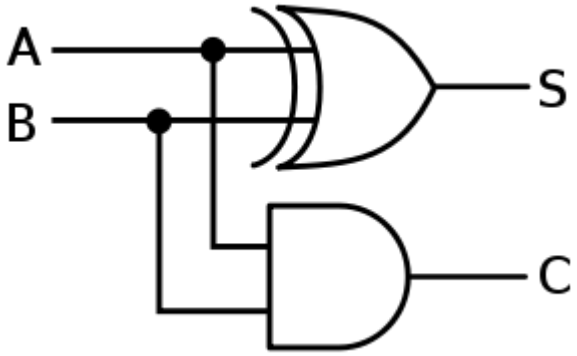
Contents

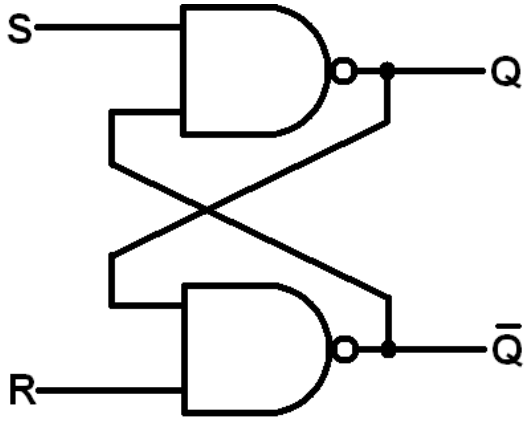
- **What you will learn:**
  - Combinational / Sequential logic circuit
  - Soldering / Prototyping
  - Schematic Design
  - Hardware Description Language (Verilog)
  - Hardware Simulation
  - Field-programmable Gate Array (FPGA) Programming
- **Final Project**
- **Practice Guideline**

What you will learn

- **Combinational and sequential logic circuit**



<Half adder>

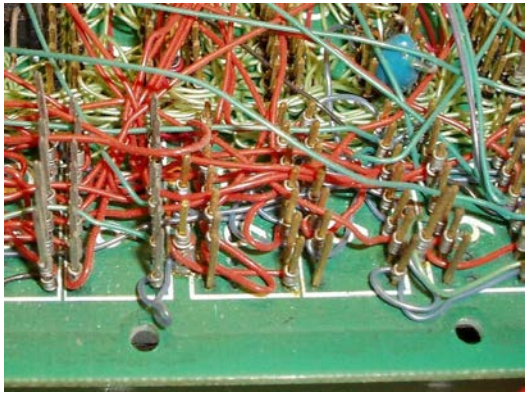


<SR Latch>

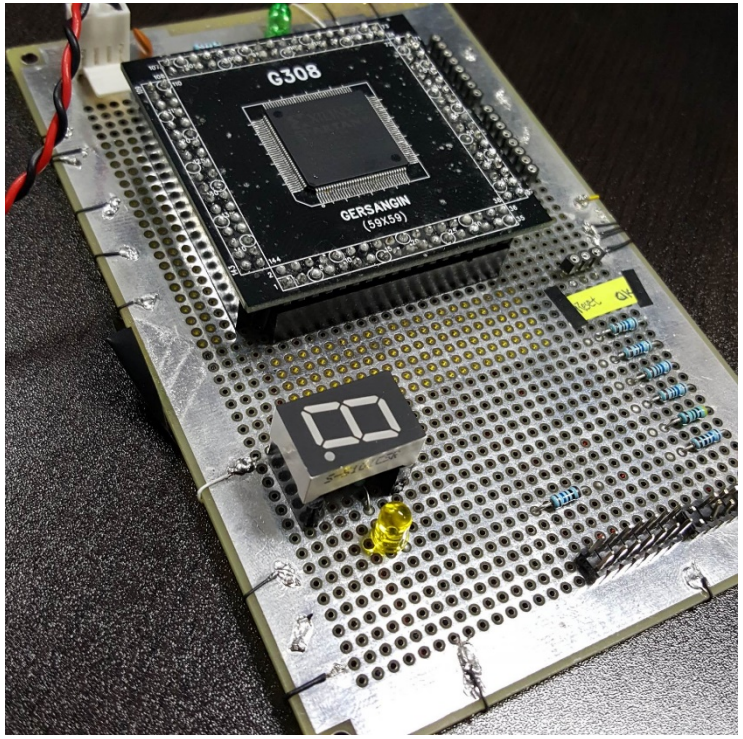
What you will learn

- **Soldering and prototyping**

Wire wrapping



Soldering

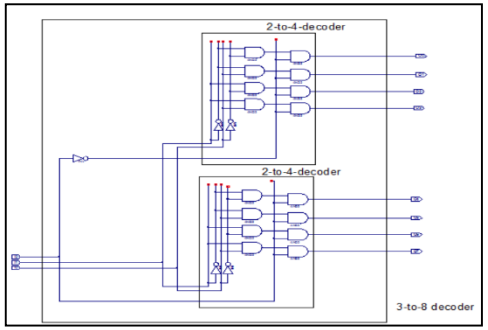


Prototyping

What you will learn

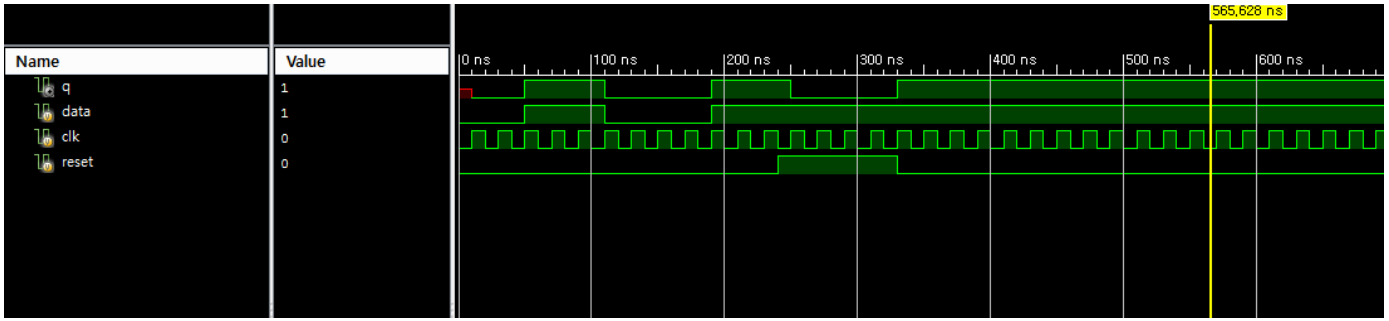
- **Computer Aided Design**

Schematic Design



Hardware Description Language

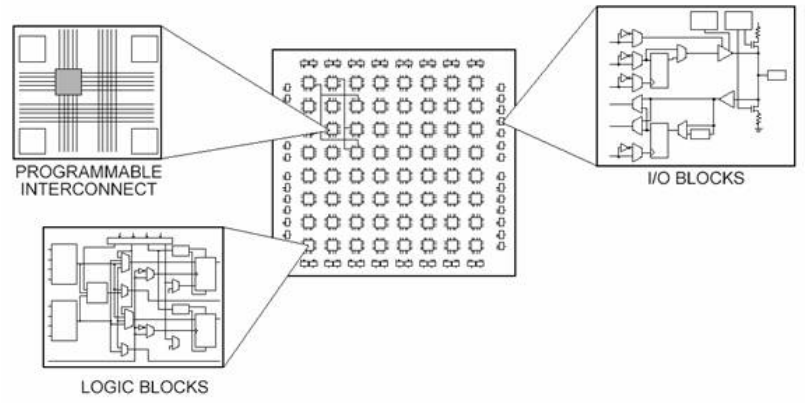
```
module seq_test_module(data, clk, reset, q);
   input data, clk, reset;
   output q;
   reg q;

   always @ (posedge clk)
   begin
      if (reset == 1)
         q <=0;
      else
         q <= data;
   end
endmodule
```



Hardware Simulation

What you will learn

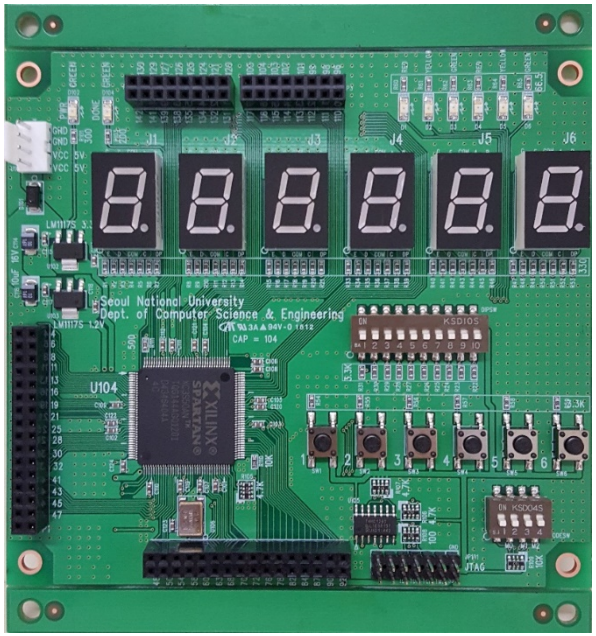
- **Field Programmable Gate Array (FPGA) Programming**



Final Project

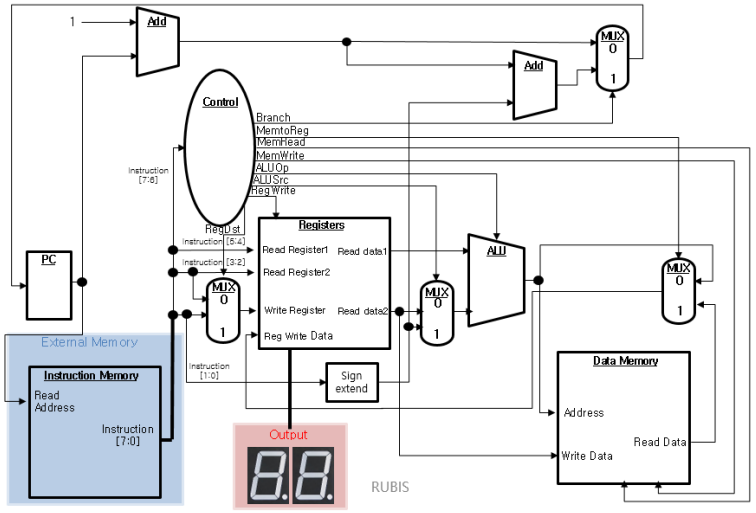
Final Project

- **You will be given:**



<Custom-made logic design board>

- **You will have to make:**

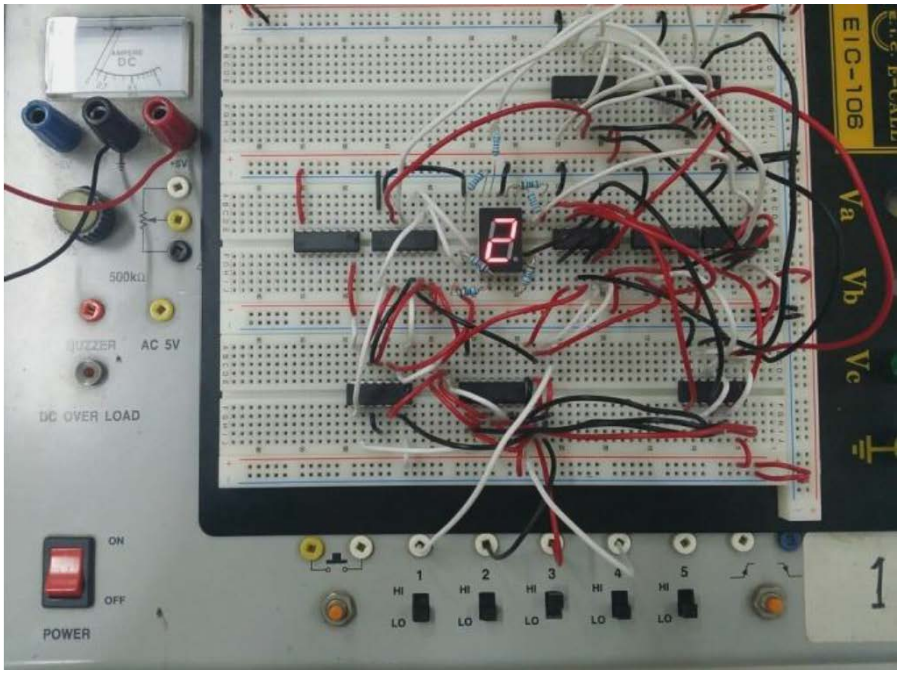


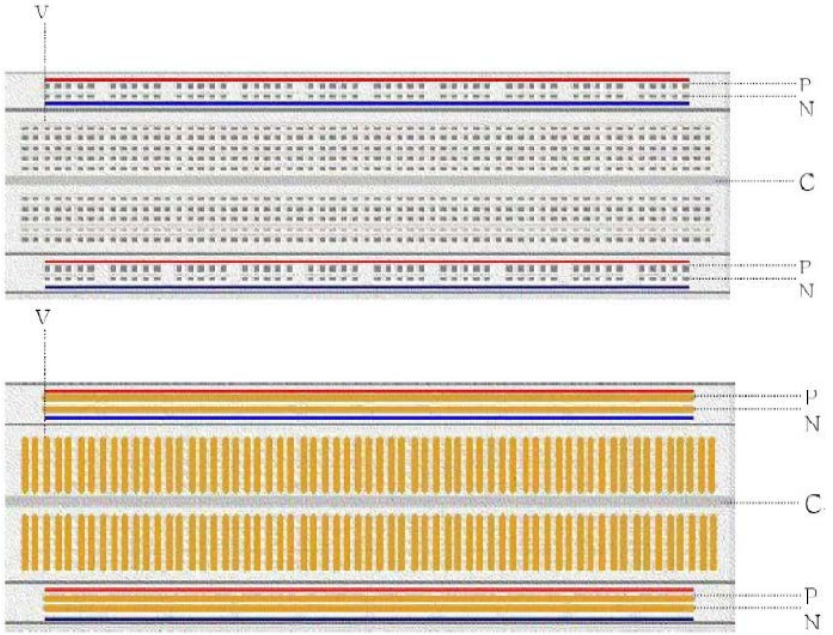
<Microprocessor>

Practice Guideline

Breadboard

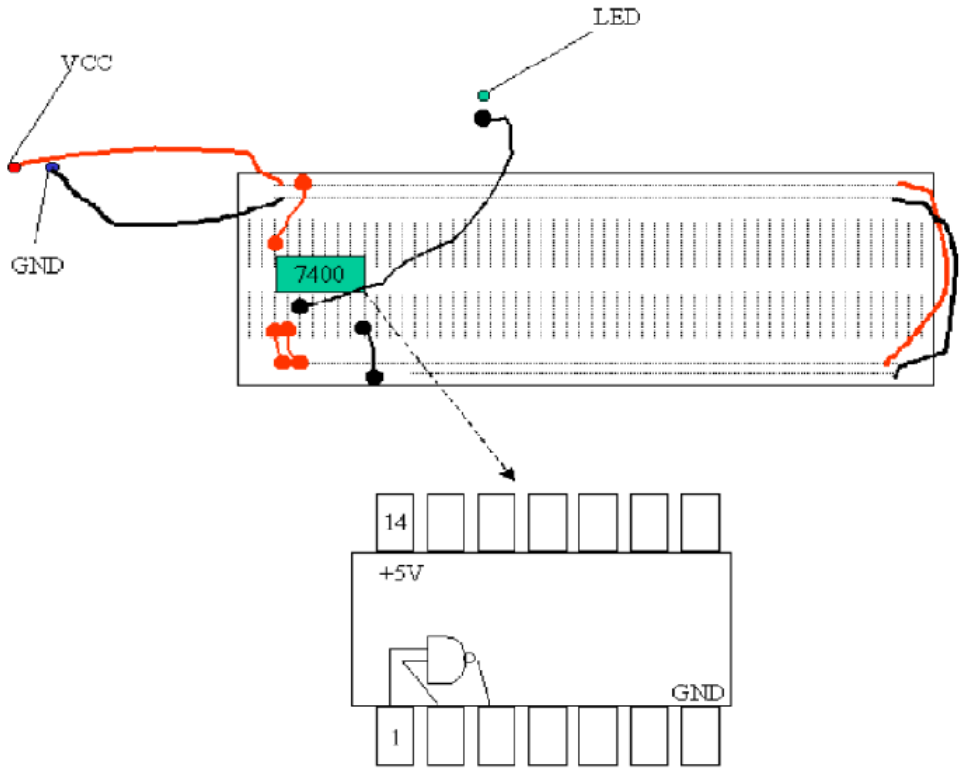
- **Breadboard**





Breadboard (Continued)

- **Implementation guide**

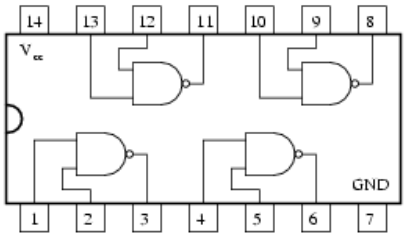


✓ A circuit using 7400 Quad 2-Input NAND gate is constructed on the bread board

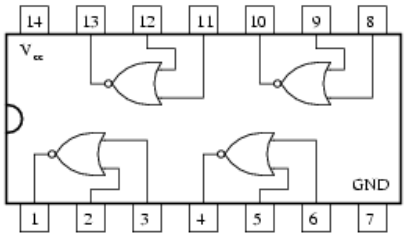
Logic Gates

- **Logic Gates**

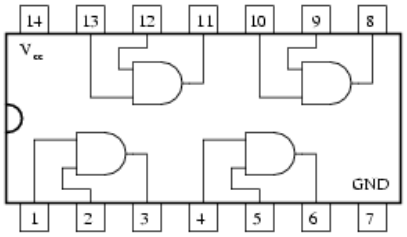
5400/7400
Quad NAND gate



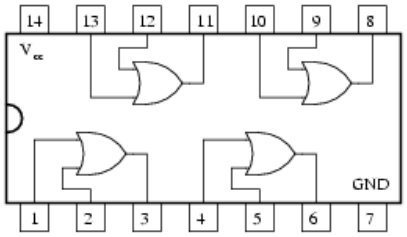
5402/7402
Quad NOR gate



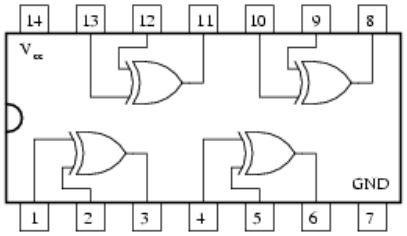
5408/7408
Quad AND gate



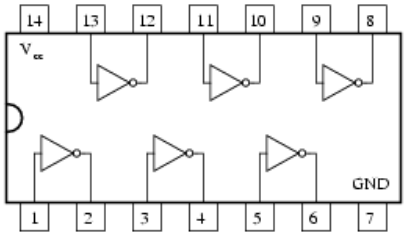
5432/7432
Quad OR gate



5486/7486
Quad XOR gate



5404/7404
Hex inverter



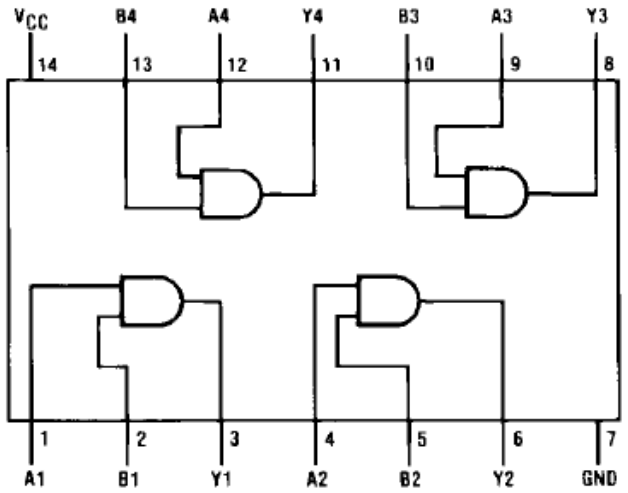
Practice with a breadboard

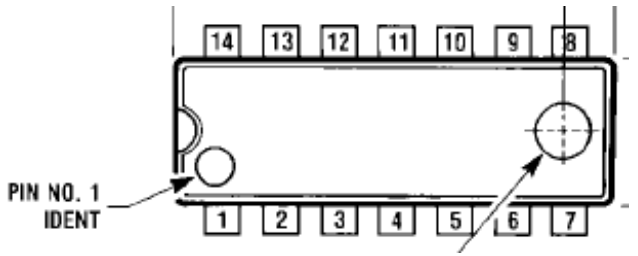
- **2-Input AND Gate (7408)**

Y = A·B

Inputs		Output
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

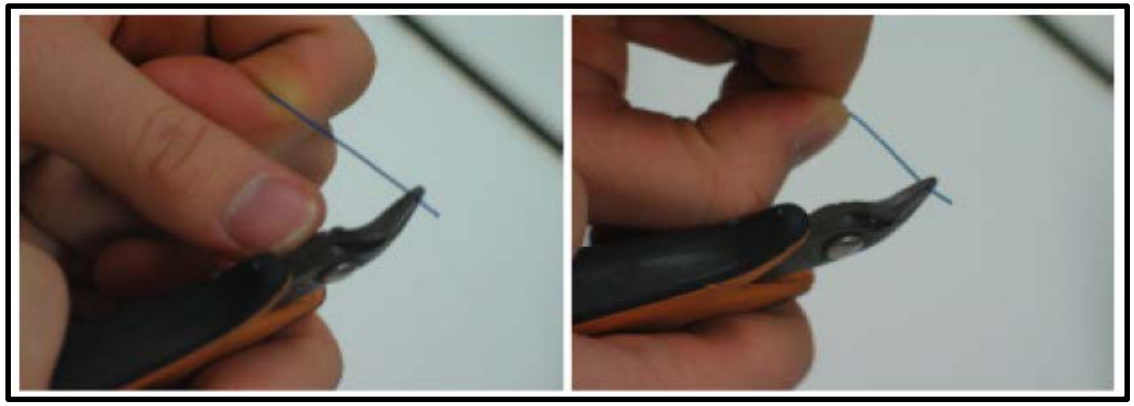
Connection Diagram





Tools

- **Bead Nipper**



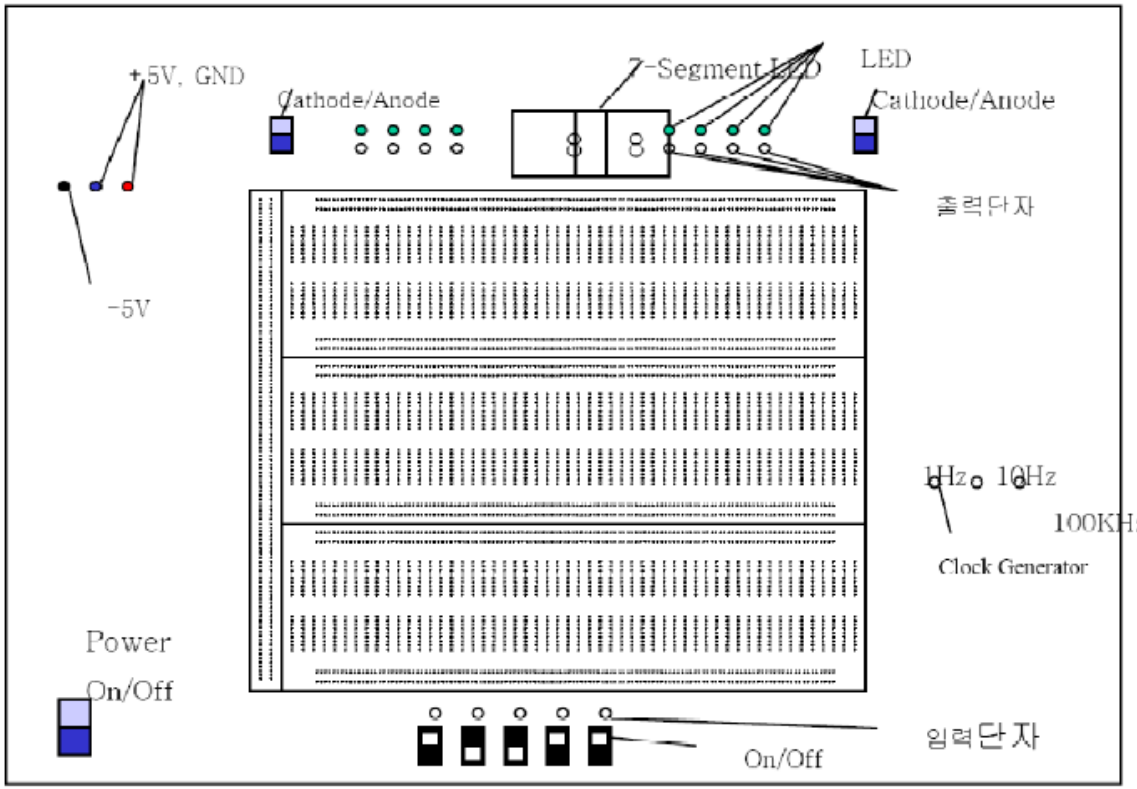
Ripping off coating

- **Extracting chips**

  - To extract IC chips, use IC Chip extractor.
  - Never extract chips using your hand

Lab Unit

- **Lab Unit**



Power Supply

- **Set current and voltage**
  - Maximum allowed current
  - Supplied voltage
- Always supply 5V.

Questions