

# Lab Report 1

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## Experiment 1 (Part A) - Truth Table of NOT Gate

### Objective:

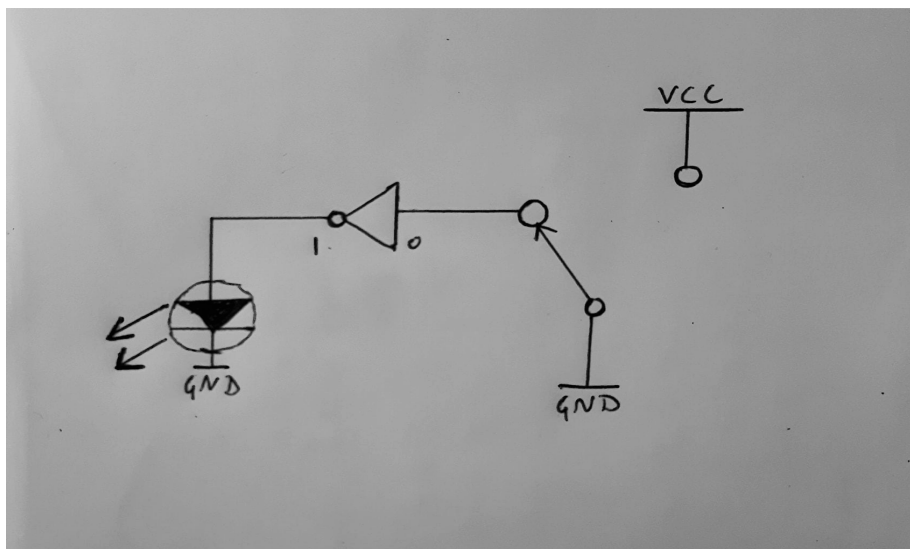
Implementing the truth table of a NOT Gate using the Digital Test Kit.

### Electronic Components Required:

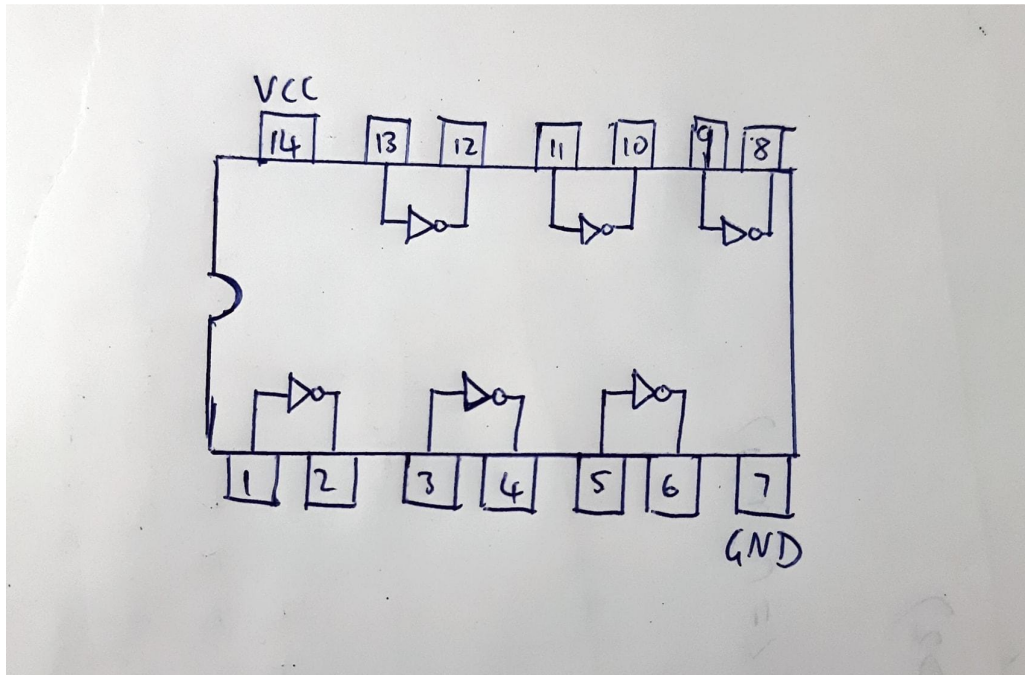
1. Digital Test Kit
2. 74HC04 IC NOT Gate
3. Voltage Supply
4. Normal Wires

### Reference Circuit:

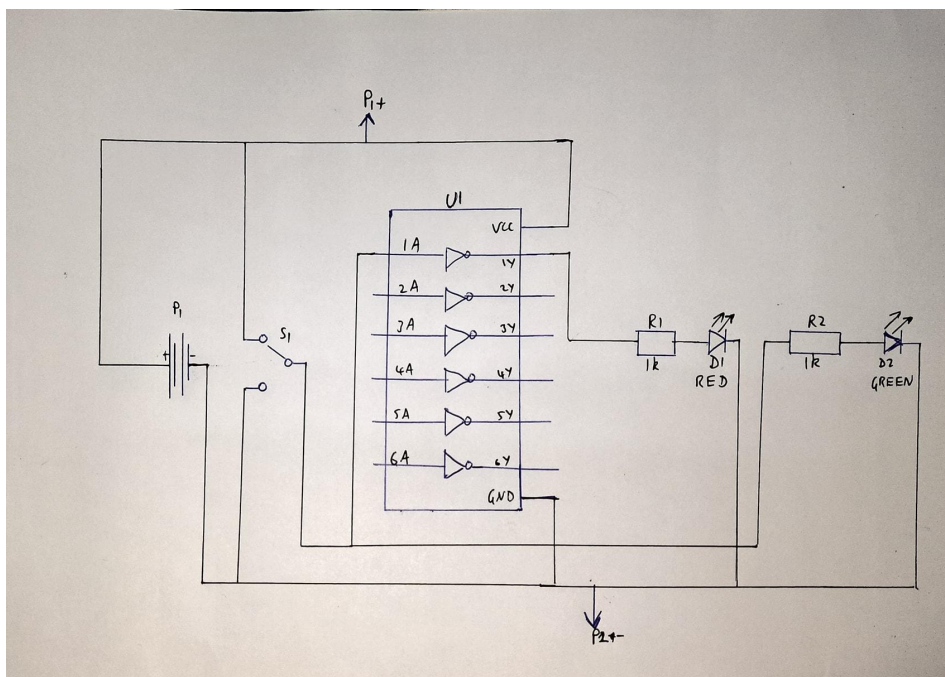
1. Circuit Diagram - (i)



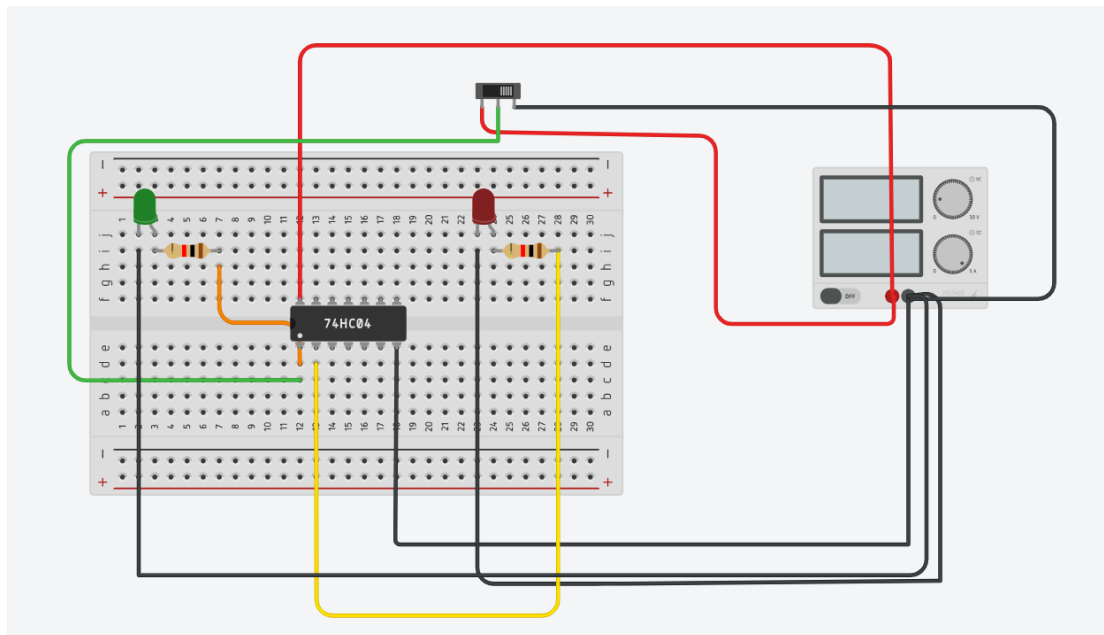
## 2. IC Diagram (NOT Gate)



## 3. Circuit Diagram - (ii)



## 4. Tinkercad Screenshot



### Procedure:

1. Switch on the VCC Supply and then select the clock control to fast.
2. Check for the glow of CLK-R LED.
3. Check the voltage difference between VCC and GND using a multimeter. Keep the multimeter in DC Voltage Setting.
4. Check the working of the input pins (IP1-IP12) by measuring voltage differences using the multimeter.
5. Check the working of the LED display (DP1-DP8).
6. Connect the 74HC04 IC to the breadboard in the middle on either side of it.
7. Connect the VCC pin and GND pins of the digital test kit.

8. Using the connecting wires, connect one of the input gates of 74HC04 IC to one of the input switches (IP1-IP12).
9. Using connecting wires, connect the corresponding output gate of 74HC04 IC to one of the display LEDs (DP1-DP8).
10. Check for the glow of the display LEDs.

### **Observations:**

1. The measured voltage will be 5 Volts.
2. Before connecting the 74HC04 IC NOT Gate, the led glows red when switched on and green when switched off.
3. After 74HC04 IC is connected, the input signal gets reversed and the LED glows green when switched on and glows red when switched off.

### **Conclusions:**

We can conclude that 74HC04 IC NOT Gate changes the input 1 to 0 and the input 0 to 1.

### **Link for Tinkercad Simulation:**

<https://www.tinkercad.com/things/1sbgX9yx0Um-2023113012g9labreport1/editel?sharecode=T2UwMmjO6efea79G6672EIOkb8RIk68cTXyzZvkAEI8>

## Experiment 1 (Part B) - Truth Table of NOT Gate Using Arduino

### Objective:

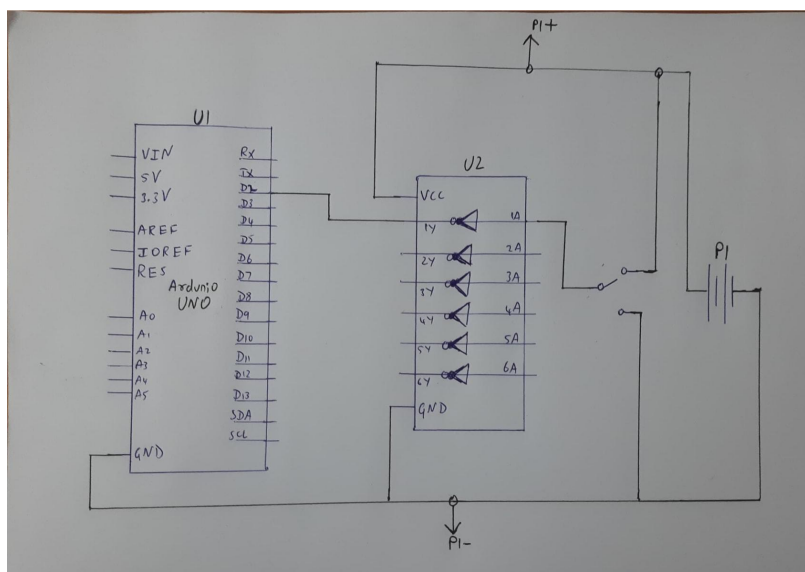
1. To write and compile C code for ATmega328P in Arduino ISP.
2. If the output of the NOT Gate is 1, print "Hello World" on the serial monitor and print "0" if the output of the NOT Gate is 0.

### Electronic Components Required:

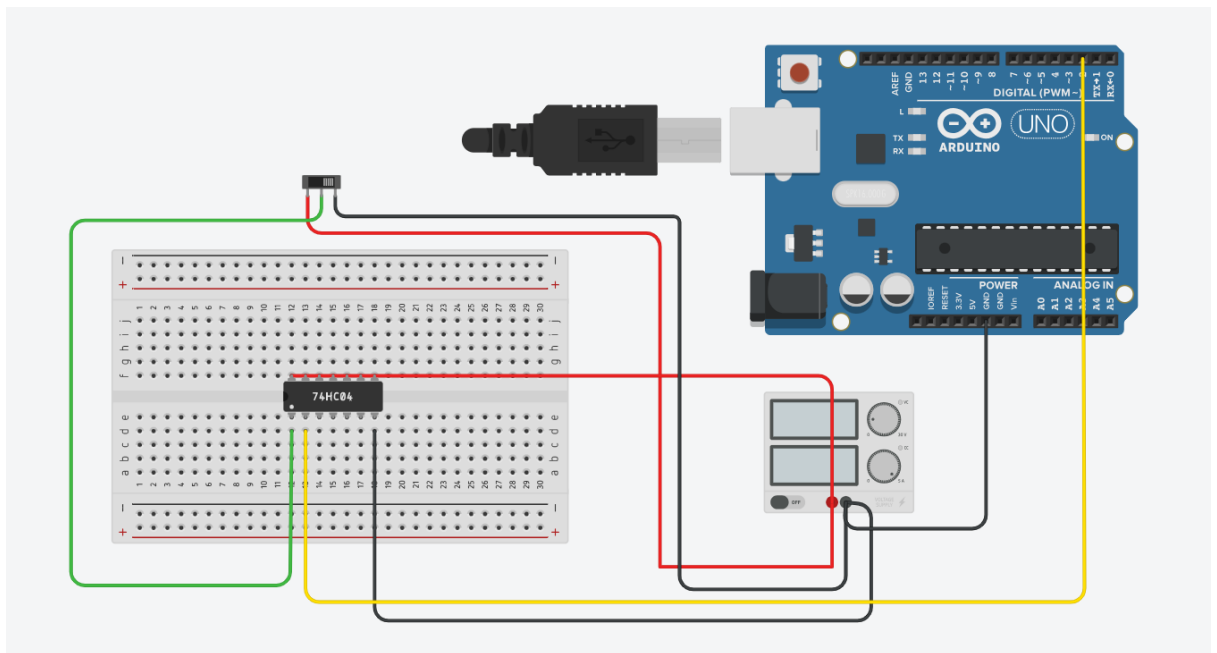
1. Arduino UNO
2. 74HC04 IC NOT Gate
3. Normal Wires
4. Digital Test Kit
5. Voltage Supply

### Reference Circuit:

1. Circuit Diagram




## 2. Tinkercad Screenshot



### Procedure:

1. Connect 74HC04 to the breadboard in the middle on either side of it.
2. Connect the VCC (pin 14) and GND (pin 7) pins of the NOT Gate to the VCC and GND lines on the top and bottom of the breadboard.
3. Connect the VCC (5V) and Ground (GND) of the Arduino to the VCC and the GND lines of the breadboard.
4. Connect one of the inputs of the NOT Gate to one of the IP Switches of the breadboard. Connect the corresponding output of NOT Gate to one of the 14 Digital Pins of the Arduino.

5. Write the following code in Arduino:



```
1 //code
2 const int notGateOutputPin = 2;]
3
4 void setup() {
5   pinMode(notGateOutputPin, INPUT);
6   Serial.begin(9600);
7 }
8
9 void loop() {
10   int notGateValue = digitalRead(notGateOutputPin);
11
12   if(notGateValue == HIGH)
13     Serial.println("Hello World");
14   else
15     Serial.println("0");
16
17   delay(1000);
18 }
19
```

6. Connect the Arduino UNO to the Laptop.

7. Select the 'Board' type and corresponding 'Port' in the Tools section of Arduino.

8. Verify the code, check for errors if any and upload the code to the microcontroller.

### Observations:

When the switch is 'ON', "0" is printed on the serial monitor. When the switch is 'OFF', "Hello World" is printed on the serial monitor.

### Conclusions:

1. When the switch is on, 1 is given as input, so NOT Gate returns 0 as output and hence "0" is printed on the serial monitor.
2. When the switch is off, 0 is given as input, so NOT Gate returns 1 as output and hence "Hello World" is printed on the serial monitor.

3. NOT Gate inverts the given input signal.

**Link for Tinkercad Simulation:**

<https://www.tinkercad.com/things/2UZJpqZvEc2-2023113012g9labreport1/editel?sharecode=KRTJiZu0RkcNrggpI-PKxreow4Op1FvkORkB1bwt17Q>