# IC Tester using 8051 microcontroller

Hardware components:

- AT89S52 Microcontroller.
- USBASP Programmer.
- USB to TTL module (For ATSTAMP).
- 7453 IC (AND/OR Invert Gate).
- 74377 IC (Octal D Flip Flop).
- 74174 IC (Hex/Quad D Flip Flop).
- 4029 IC (Binary/Decade Up/Down Counter).
- 1x 22.1184 MHz Crystal Oscillator.
- 2x 33pF capacitors.
- LEDs.
- 330 Ohm Resistors.
- 10 µF capacitor.
- Switch.
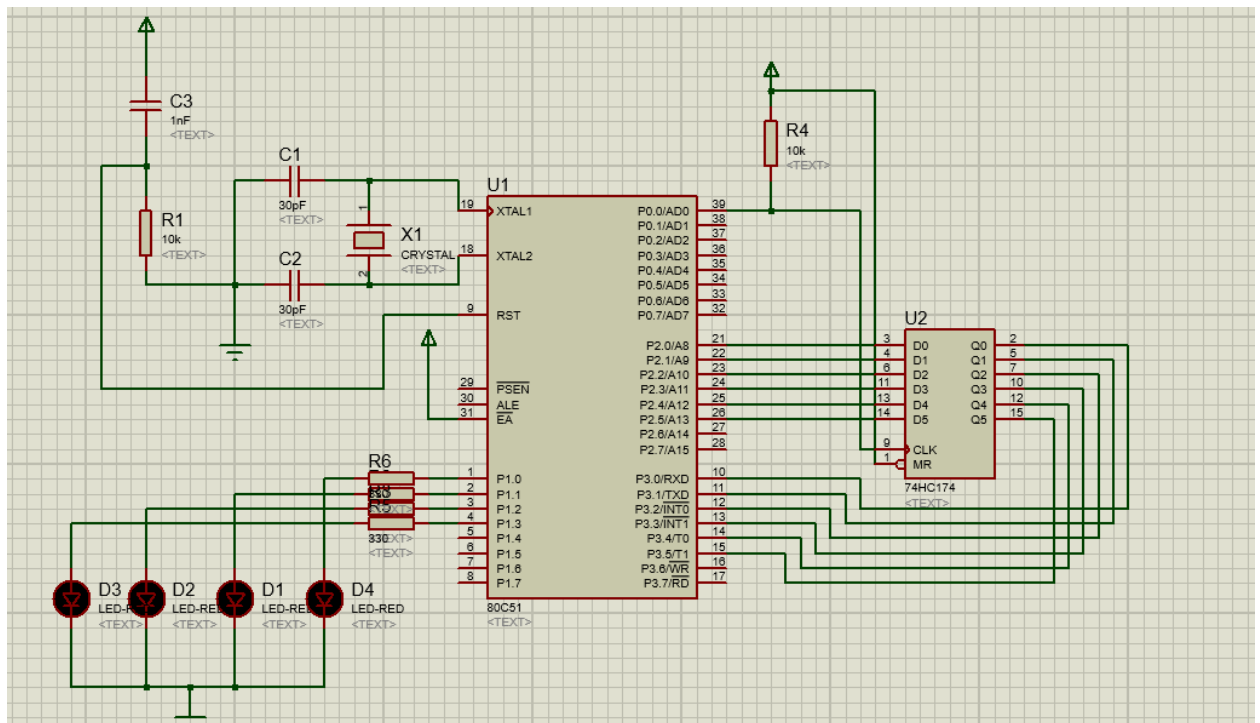- Connectors.

Schematic of each IC:

1. 7453 IC: (I can not find 7453 on proteus and I used 7454 which is similar to it except that 7453 have two extra pins which are called x and not x. I connect x pin to VCC and not x to GND).
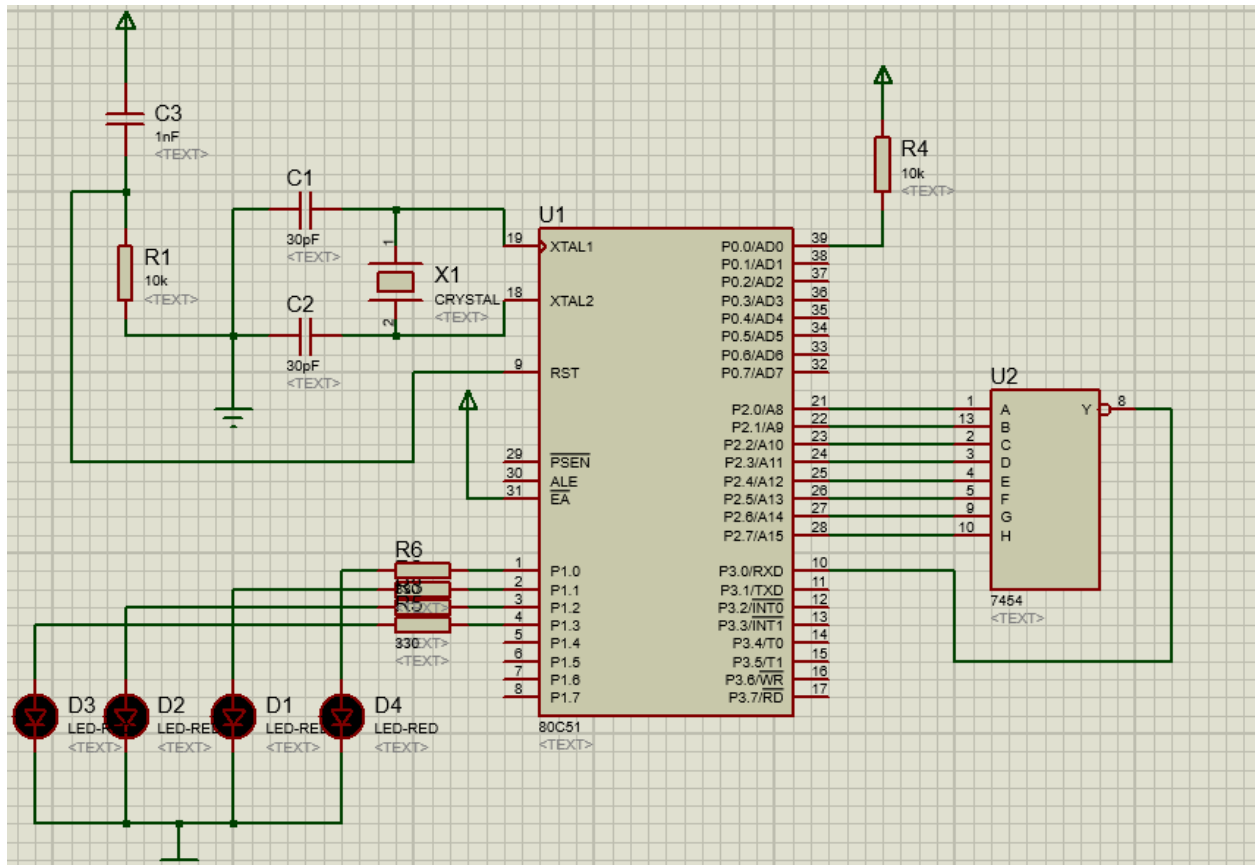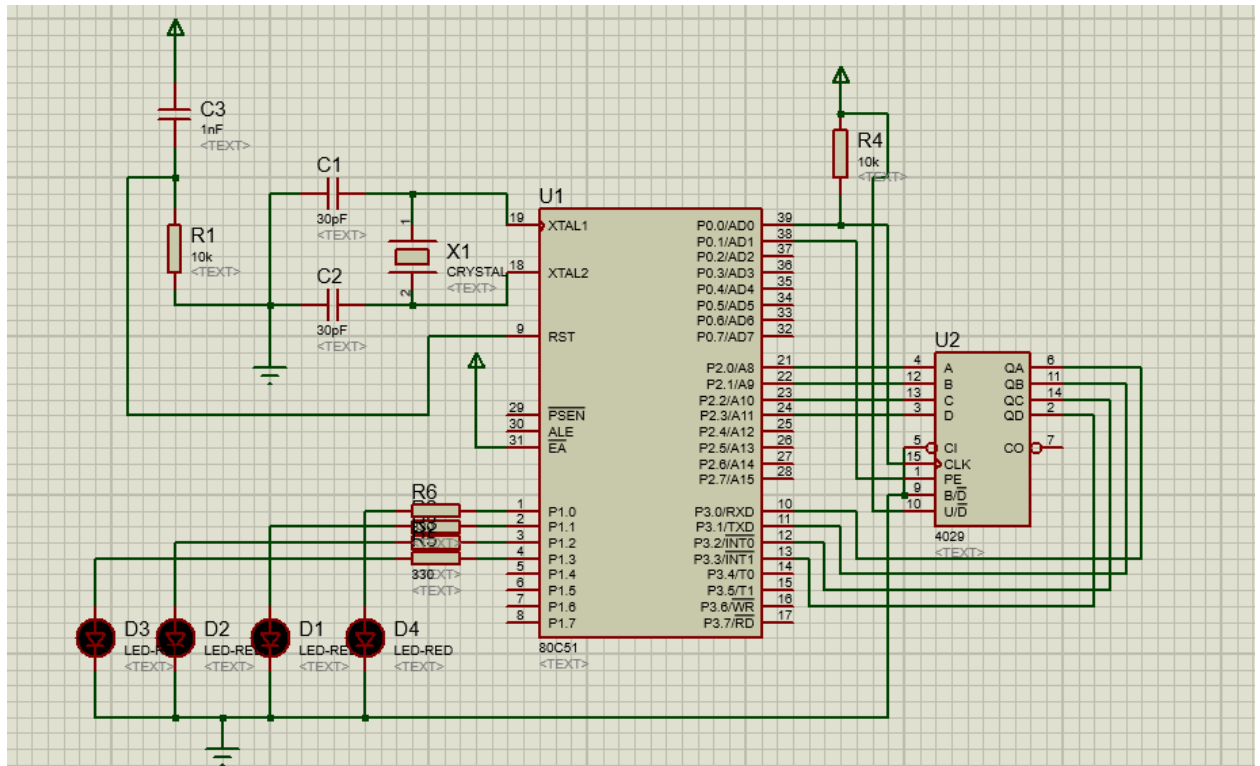
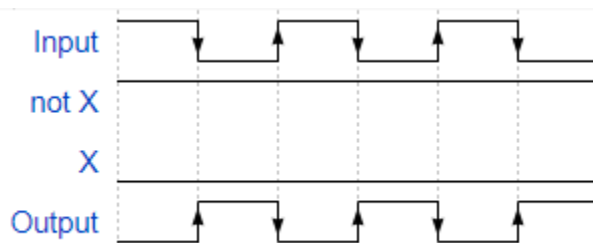## 2. 74377 IC: 74377 is not simulabe on proteus.
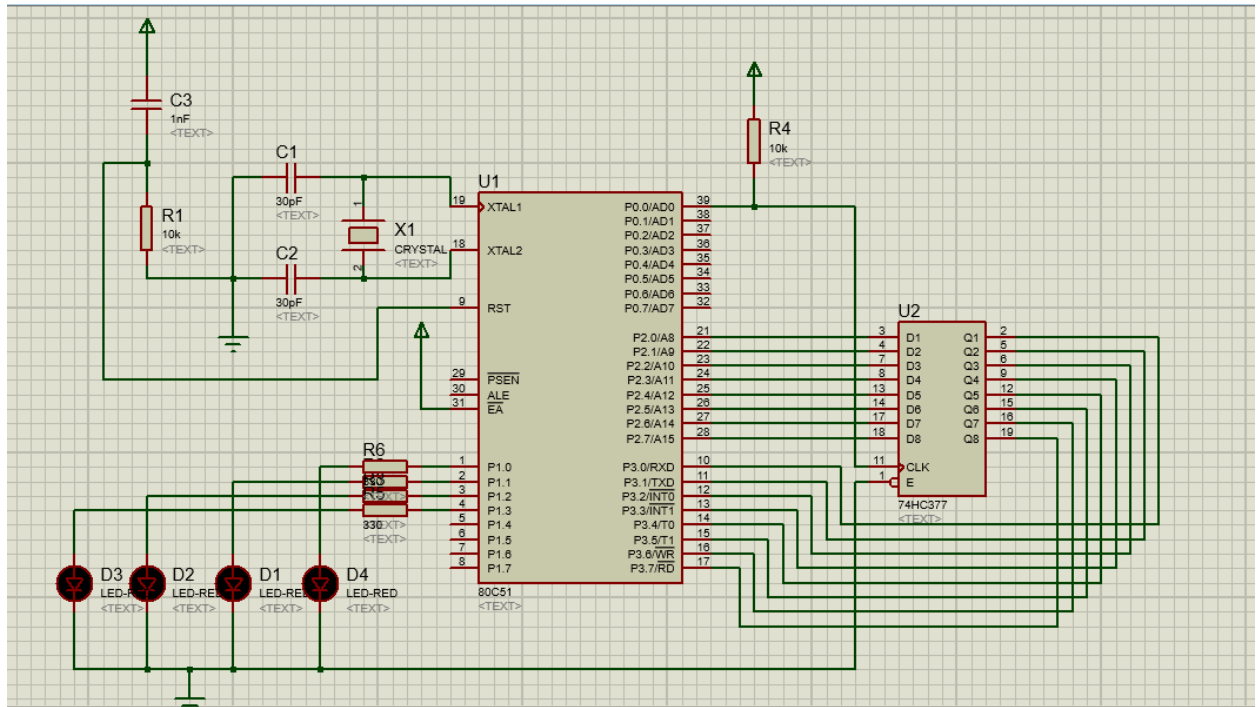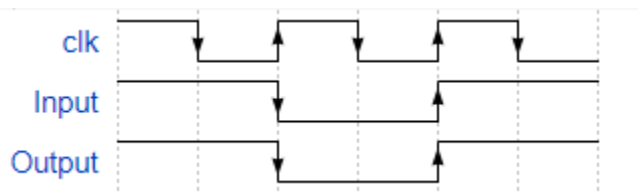

3. 74174 IC:

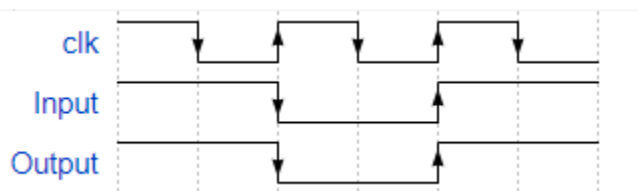## 4. 4029 IC:

Timing diagram:

1. 7453 IC:

Output of 7453 is low if you connect x pin to VCC and not x to GND so the output of PORT3 will be **0xFE**.

2. 74377 IC:

Output of 74377 is the same of input at each positive edge of the clock. The output of PORT3 will be **0x00** at the second positive edge of the clock when code read the data from PORT3.

3. 74174 IC:

It is the same of 74377 but the difference is 74377 is an octal D flip flop but 74174 is Hex/Quad D flip flop. 74377 have 8 output pins but 74174 have only 6 output pins. At the second positive edge of the clock, the output of PORT3 will be **0XC0**. Non connected pins of PORT3 always have high level.

4. 4029 IC:

Decade Mode
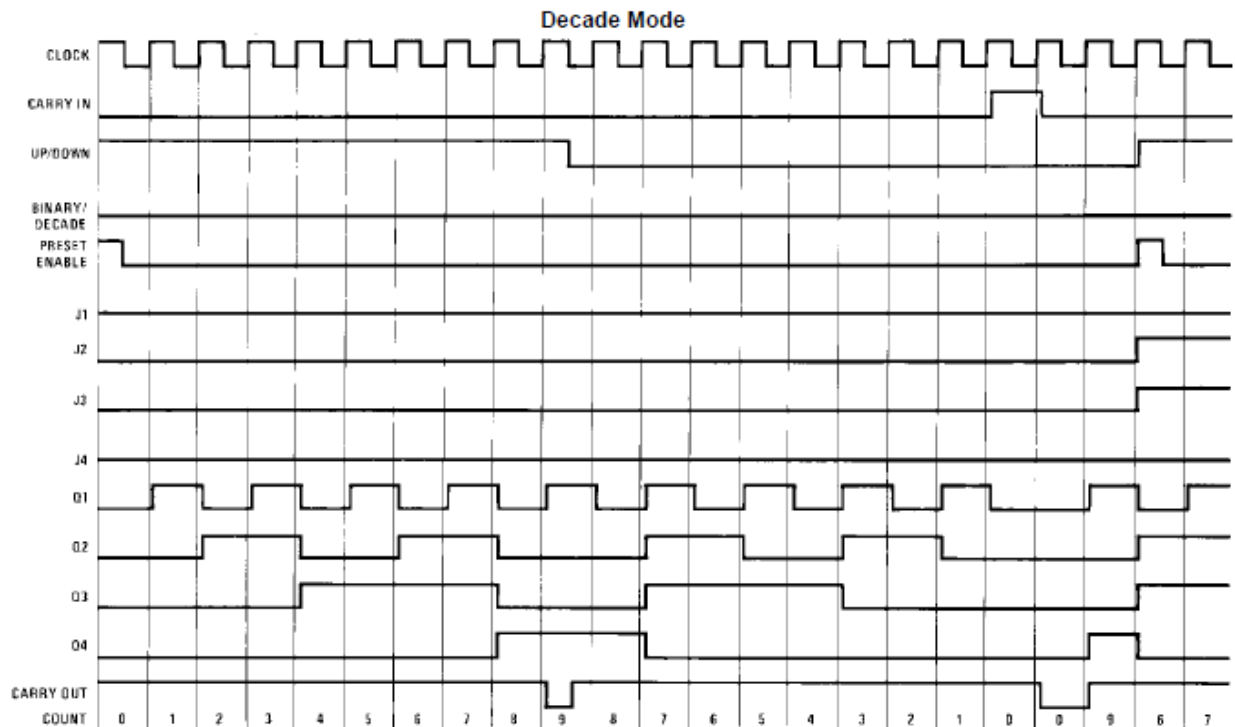
4029 IC stores the last output and when powered on again it counters from the last output. But when preset enable is high, the output of counter equals to the input.

I used this technique to test 4029 IC to prevent 4029 IC to continue counting from the last output. 4029 counts from zero and then go to one but at that moment preset enable pin is enabled and 4029 counts again from zero because the input at that moment is zero also.

The output of PORT3 will be **0xF0** or **0xF1**.

ATSTAMP:

Because I need to Tx and Rx pins of PORT3 so I changed the schematic and let PORT0 is output instead of PORT3 and PORT1 have clock pin for ICs that need clock instead of PORT0.

Delay:

I generate a 1 msec delay using timer1.

8051 microcontroller divides the clock frequency by 12.

I used 22.1184 MHz. But microcontroller divides it by 12 to become 1.8432 MHz. T = 1/1.8432 = 0.5425 μsec.

To calculate the values of TL1 and TH1 follow these equations:

X * 0.5425 μsec = 1 msec.

X = 1843.

65536 − Y = 1843.

Y = 63693 (0xF8CD in HEX).

TL1 = **0xCD**.

TH1 = **0xF8**.