

**Digital Logic Design**

**Project**

Course :CSE231

Section: 03

Group :08

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**Objective:**

The purpose of our project is to design a circuit which will display “HELLOCSE231-3-8” via a 7 segment display. This project has two parts.

1. Combinational Part
2. Sequential Part.

In the combinational part, we have designed a combinational circuit using 8:1 multiplexers. We used multiplexers because it is easy to implement and it has low gate input cost. In this part, we have shown that string in the 7 segment display by changing inputs manually.

And, in the sequential part we have designed a sequential circuit using basic logic gates and Flip-Flops . We used 2 JK Flip-Flops and 2 T Flip-Flops. Because of using the combination of JK and T Flip-Flops ,we found the most simplified circuit. AND gates and OR gates will be used to design the combinational part of sequential part. In the end of this part ,we were able to generate the string sequentially in the 7 segment display by using the 555 timer IC.

**Equipments** :

* Bread Board
* Wires
* 7 x IC 74151 8:1 MUX
* 2 x IC 7404 Hex Inverter (NOT gates)
* 1 x IC 7411 3 input AND gates
* 1 x IC 7408 2 input AND gates
* 1 x IC 7432 2 input OR gates
* 2 x IC 7473 JK Flip-Flops
* 9V Battery
* 1 x IC 7805 Voltage Regulator
* 1 x 555 Timer IC
* 1 x 1000 µF Capacitor
* 2 x 1 [kΩ](https://en.wiktionary.org/wiki/k%CE%A9) Resistor
* 1 x 330 Ω Resistor
* 1 x 7 Segment display(common cathode)

**Procedure** :

Our main objective is to print “HELLOCSE231-3-8”. There are two parts in the project. One is combinational part and the other one is sequential part.

For sequential circuit input ‘W’ we used JK Flip-Flop. For input ‘X’ we used T Flip-Flop. For input ‘Y’ we used T Flip-Flop. For input ‘Z’ we used JK Flip-Flop. Because by using these Flip-Flops we found the most simplified circuit. Then we added the sequential part with the combinational part.

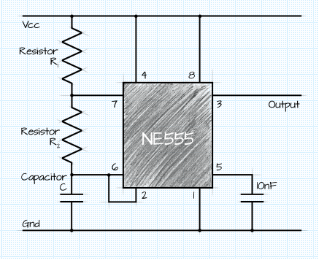
Output of the Flip-Flops will be the input of the main combinational circuit. A timer IC will be sending clock pulses to change the inputs. For every clock pulse the sequential circuit will count the decimal 0-15.

Sequential circuit is working as we wanted. Then it is giving the output perfectly. After triggering the clock sequential circuit gives the next output which is the input of the main combinational circuit. After connecting the sequential part our main objective to display in the seven-segment is working fine with the every clock pulse.

**555 Timer IC** :

The 555 timer is capable of being used in astable and monostable circuits. In an astable circuit, the output voltage alternates between VCC and 0 volts on a continual basis.

By selecting values for R1, R2 and C we can determine the period/frequency and the duty cycle.



The period is the length of time it takes for the on/off cyle to repeat itself, whilst the duty cycle is the percentage of time the output is on. ie. T1/T.

