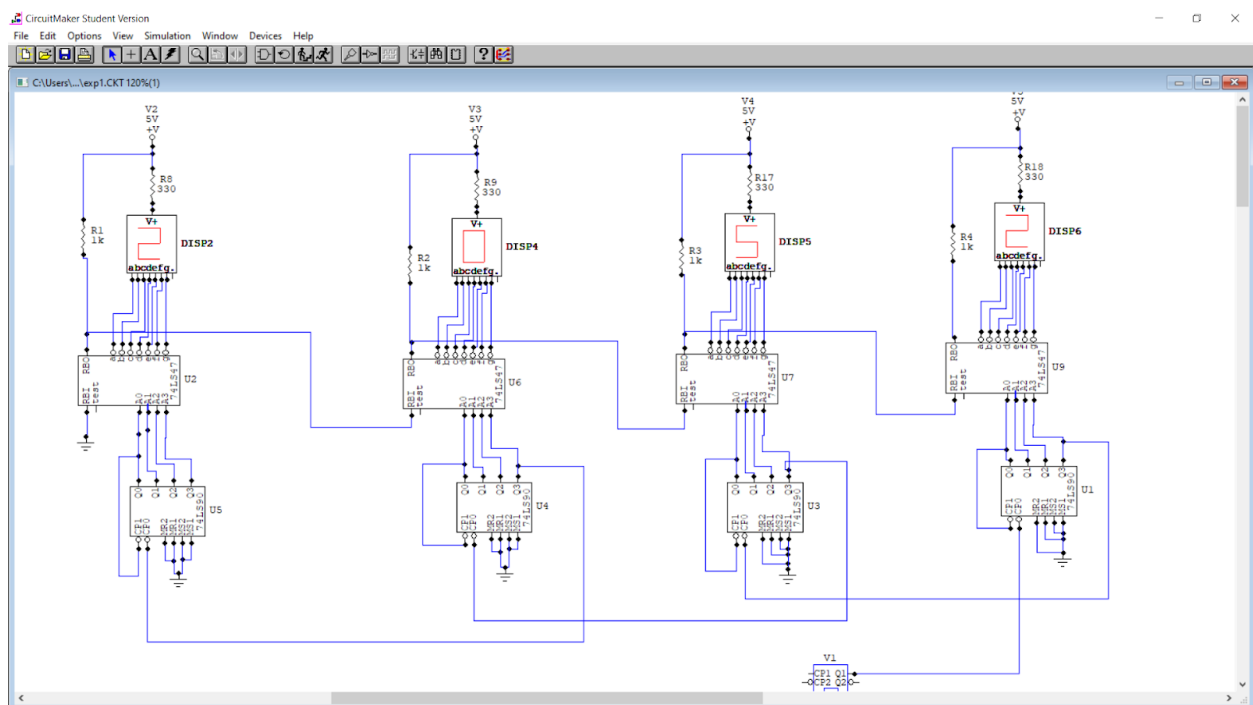# Digital Electronics Circuits lab
Lab Experiment:1

Name:Harshavardhan Alimi

Roll No:18EC10021

AIM:Displaying the digits from 0 to 9999 using 4 counters

Circuit

Video link of the output of circuit:

https://drive.google.com/file/d/13TB0r4MzbJoDHK_w4guSyOcLzJ7w-dri/view?usp=sharing

Observation & Discussion:
- To display the numbers we will be using the anode type display in the experiment along with a 7-segment display decoder/driver and a 4-bit binary counter(IC 7490/7493).
- Light Emitting Diodes are diodes made with semiconductor material having high bandgap so that the energy released due to recombination of electron-hole pair is high enough to produce a photon in the visible spectrum of light.so we use red LED to display the numbers.

- In a counter we will be using a resistor(here 330 ohm) because we know that red LED has a forward bias voltage of 1.6V but we are applying direct 5V to the counter so,to ensure the LED has voltage drop of 1.6V we will be using a resistor.
- We can either use a single resistor(at anode terminal) or 7 resistors (at the a to g terminals).if we use only one resistor and if there are more than one LED is switched on,then the current flowing through LED's will be low which makes the LED's to blow low(low brightness).
- IC 7447 is a 14 pin IC which takes in the 4bit signal and generates 7bits for 7 segment display of LED.it also contains 2 more pins which are RBI and RBO When RBI is held low nothing is displayed for BCD 0000 input. Output from the RBO of one decoder serves as input for RBI of the next decoder. Both together are used to blank out leading zeros in the display.
- And for counter we can use either 7490 or 7493:
  - IC **7490** is a 4-bit, ripple-**type** decade **counter**. It consists of four master/slave flip-flops, which are internally connected to form a divide-by-two section and a divide-by-five section. Each section has a separate clock input to change the output states of the **counter** on a high-to-low clock transition.
  - The **7493** is a 4-bit binary **counter** made of two up-**counters**. The IC consists of a mode-2 up-**counter** and a mod-8 up **counter**. Can be combined as a mod-8 **counter** or divide by 2 or divide by 8 applications. It is built using four JK Flip Flops.
    - But we use 7490 because it is a decade counter(which only counts upto 0 to 9) where 7493 is a 4-bit binary counter(which counts from 0 to 15) which is not desirable.
- IC 7490 also has 2 set pins and 2 reset pins. When connected to logic 1, the Reset inputs reset the counter back to zero, and when the Set inputs are high, they set the counter to maximum i.e. regardless of the actual count number or position. Therefore we grounded the four pins to get the continuous output.
- The use of 1kohm circuit:without the resistors the display will be having a blinking which is due to the less voltage(which is not sufficient for the LED's to blow perfectly) being obtained at RBO when it is high(i.e.,it is not a perfect high when it is high).

The output of the above circuit without 1kohm resistors:-
https://drive.google.com/file/d/1Tb1EUTPgvgxKRS5s92LtPhjSLNpwwT9E/view?usp=sharing