DIGITAL ELECTRONIC CIRCUITS LAB

REPORT 1

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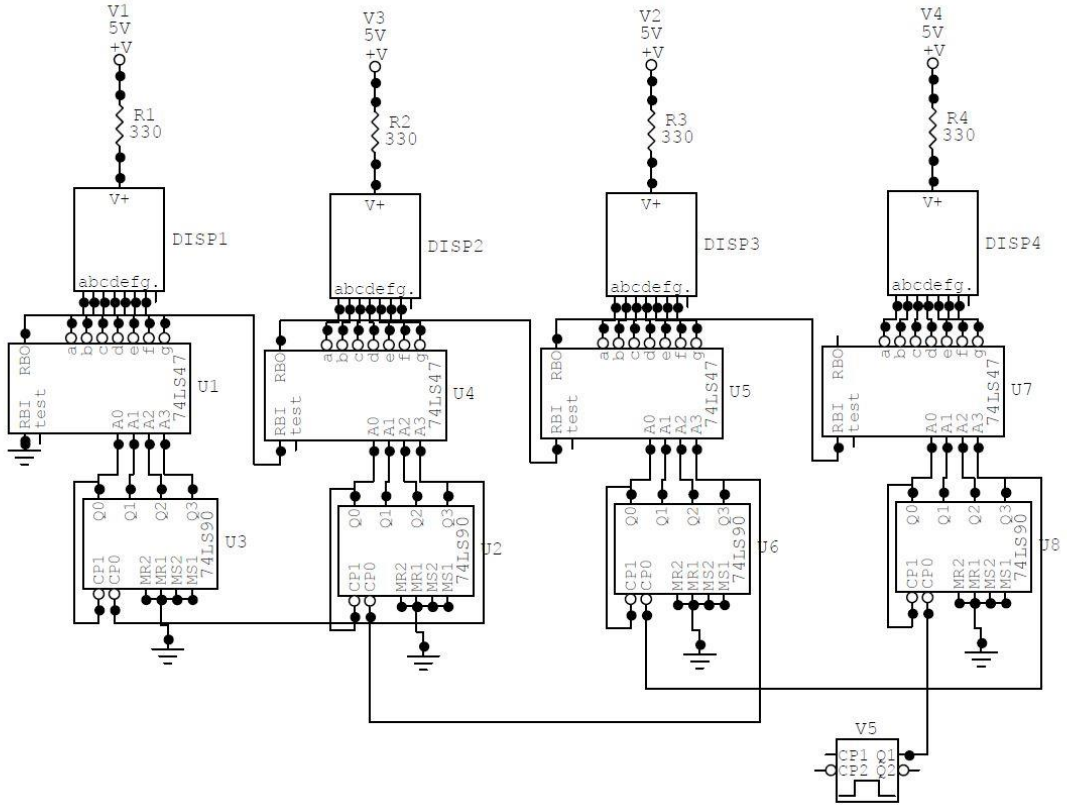
Objective: To make a counter circuit using 7 segment displays in CircuitMaker simulator.

Circuit Diagram:

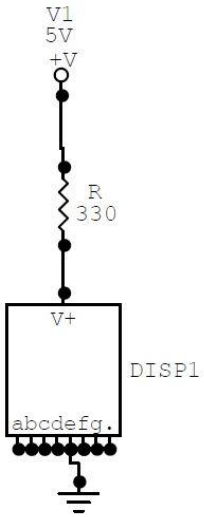


Results

During simulation, the circuit was observed to display numbers from 0 to 9999. The video link of the simulation is given below.

https://drive.google.com/file/d/1um5vYNlk0D-20TO6AiDncvlc1LyIizZ0/view?usp=sharing

Discussion:



- In this experiment, a counter was simulated which can display numbers from 0 to 9999 in increasing sequence.
- A potential difference of about 1.6 V is required to light up a red LED.
- Calculating value of resistance R in the circuit:
    - The current in the circuit is bounded by 10 mA. The voltage supply was fixed to 5 V. Therefore, $R = \frac{5-1.6}{10}\frac{V}{mA} = 330\ ohms$
- The input of the 7-segment display is controlled using 7447 and 7490 IC.
    - 7490 IC converts a digit to into its binary representation.
    - 7447 IC is provided with this binary representation, and it maps it to the sequence needed to display a particular digit in 7-segment display.
    - Instead of 7490 IC, 7493 IC could also be used but the range of resetting is (0 – 15).
- A clock is provided as input to 7490 IC of least significant digit. The falling edge of the clock is employed as trigger for the IC. From the next digit onwards, the most significant bit of the previous digit is used as input to the 7490 IC so as to ensure that it is triggered when previous digit changes from 9 to 0.
- To avoid display of leading zeros in the display, the RBI of the most significant digit is grounded and the RBO is connected to the RBI of previous digit. This is done for all digits except the least significant one, for which the RBO is left floating.