

DIGITAL ELECTRONIC CIRCUITS LAB

EXPERIMENT 7

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Objective

- To input 8 characters of Institute Roll No. via ASCII keyboard
- To store the characters in a RAM
- Displaying the characters repeatedly on a 7-segment display via reading it from RAM

Circuit Diagram

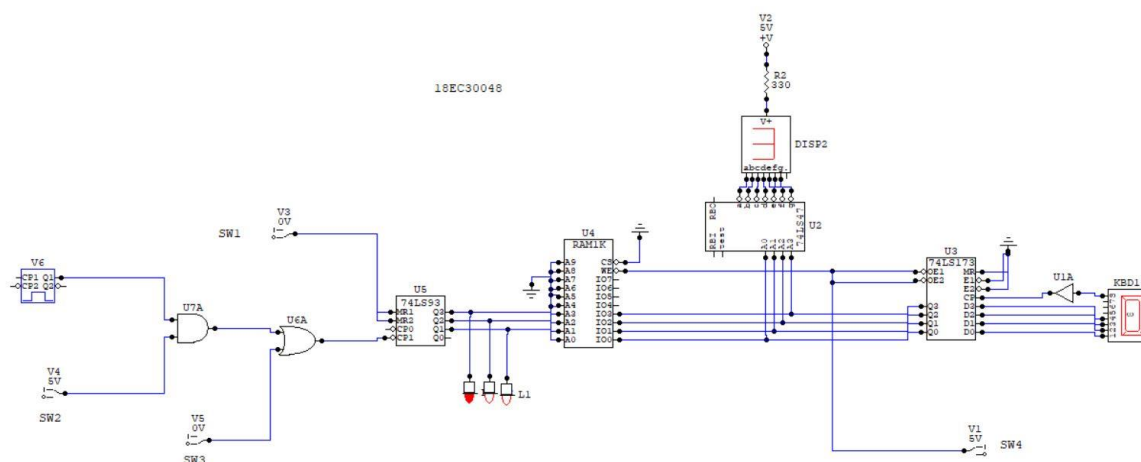


Fig 1. Circuit to perform the above tasks. IC 74173, 7493, 7447, CD 4050, etc are used.

Simulation

The simulation of the above circuit is available on

<https://drive.google.com/file/d/1BNTmYamkqZRvcE-sXMFTYr1JcQu-ilU1/view?usp=sharing>

Discussion

1. For taking inputs, ASCII keypad is used. As my roll number is 18EC30048, it was required to display 18EC3048. For this, it was needed to input following literals in the given sequence:
$$1 \rightarrow 8 \rightarrow n \rightarrow j \rightarrow 3 \rightarrow 0 \rightarrow 4 \rightarrow 8$$
2. Initially value of the switches and their significance is given below:
 - a. SW_1 is initially set to logic low. It acts as reset control for the circuit. When it is logic high, the $Q_3Q_2Q_1$ of IC 7493 (which is an asynchronous counter) are all reset to logic low.
 - b. SW_2 is initially set to logic low. It acts as pulsar enable. When it is logic high, then the pulse generated from the pulsar can change the values of $Q_3Q_2Q_1$ of IC 7493. This is required while reading from the RAM. But while writing in to the RAM, it must be logic low.
 - c. SW_3 is initially set to logic low. It is used for changing the address in RAM for reading/writing purpose.
 - d. SW_4 is initially set to logic high. It is used for writing into the RAM by turning it to logic low and then back to logic high.
3. **Writing into RAM**
 - a. For each of the literal in the sequence given in (1), we do the following:
 - i. Press the given key for the literal from keyboard.
 - ii. Set SW_4 to logic low, and then back to logic high to write this literal in current address.
 - iii. Set SW_3 to logic high, and then back to logic low to increment the address.
4. **Reading from RAM**
 - a. Just set SW_2 to logic low. Due to this, clock pulses of pulsar are received in IC 7493. As I am using MOD8 mode, $Q_3Q_2Q_1$ will take values from 000 to 111 and back to 000 and this cycle continues till simulation runs.
5. The lamps are connected for determining the current address where the data is being written/read.
6. As the RAM1k has $2^{10} = 1024$ distinct address, each capable for storing 8 bits. For this experiment, as we are dealing with only 8 character, each having only 4 bits information, hence the address terminals A_3, A_4, \dots, A_9 are all set to logic low and we are only interested in the least significant 4-bits for the display, hence only IO_3, IO_2, IO_1, IO_0 is used in the circuit while other are floating.