

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY College of Engineering and Technology Department of Electronics and Communication Engineering
<b>18ECC212J Fundamental of computer system Design</b> <b>III Semester, 2022-2023 (ODD Semester)</b>

**Title of Mini Project : Digital Clock without Microcontroller**

**Date of Submission : 14-11-2022**

Particulars	Max. Marks	Marks Obtained		
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		<b>Register No. RA2111043010028</b>	<b>Register No. RA2111043010038</b>	<b>Register No. RA2111043010025</b>
Design	15			
Demo verification & viva	20			
Project Report	05			
<b>Total</b>	<b>40</b>			

### REPORT VERIFICATION

**Staff Name :**

**Signature :**

# DIGITAL CLOCK - ABSTRACT

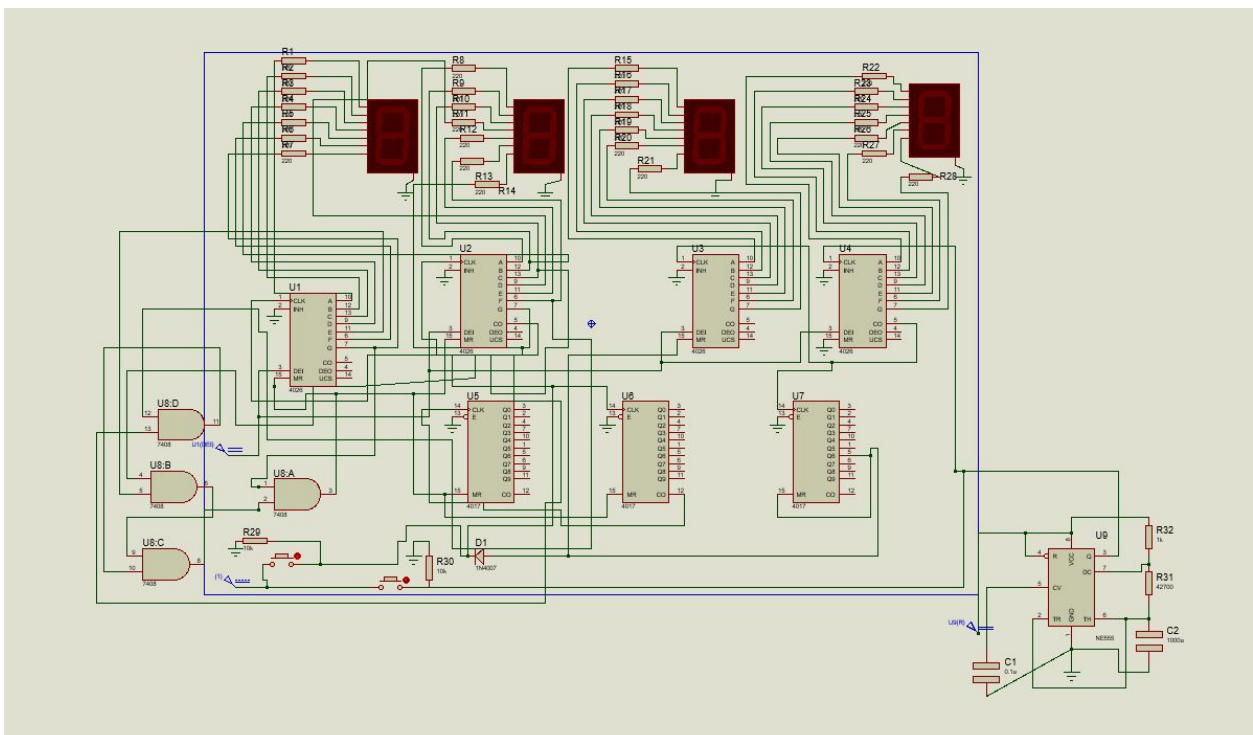
## OBJECTIVE

- *This mini-project is not a commercial product. This is solely designed for educational purposes.*
- *The main objective of this project is to implement the basic operations of Counters, Pulse Generators, Digital Gates, PCB Designing.*
- *However, this can be considered as a commercial product in terms of the main function of this project.*

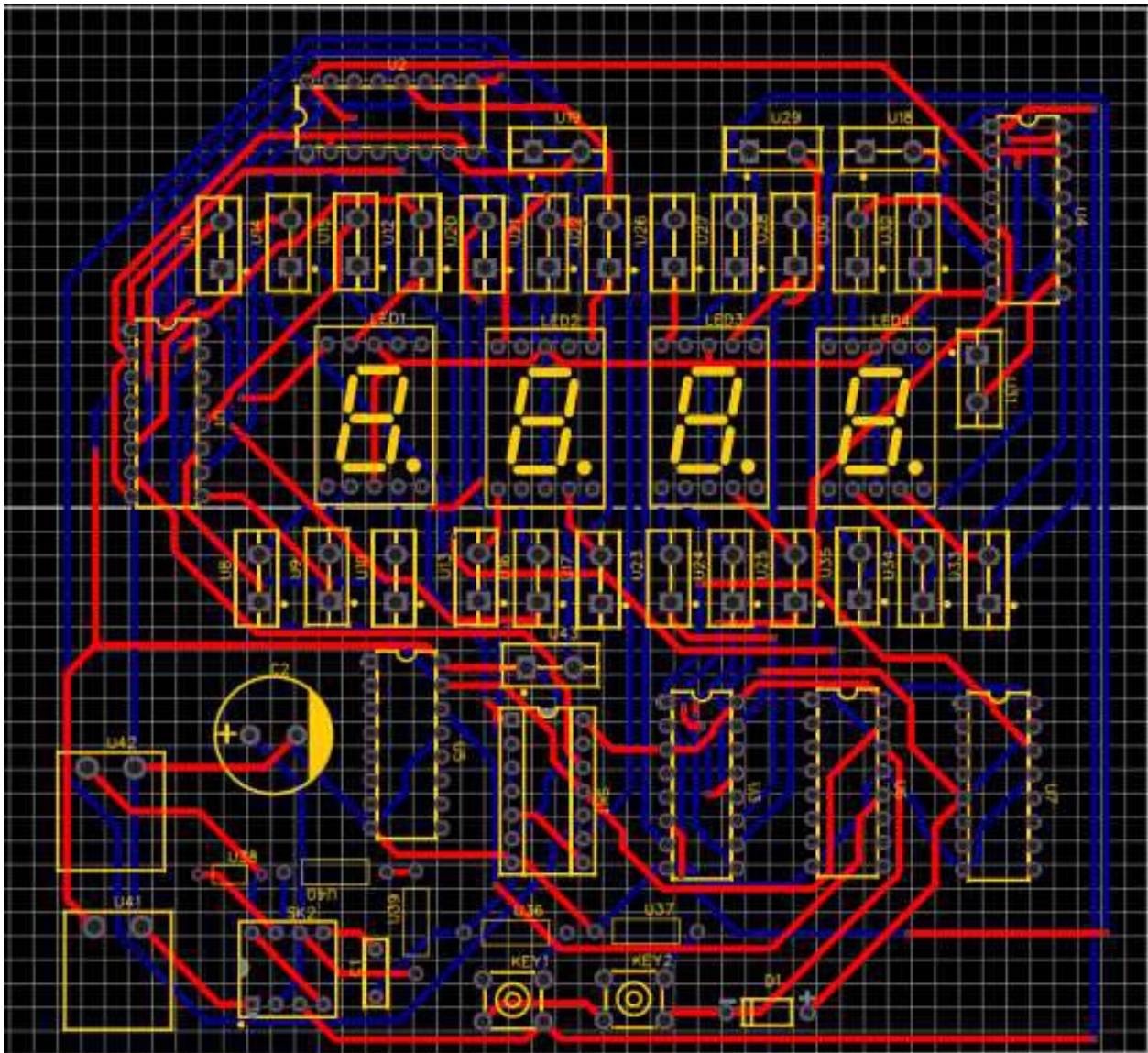
## SOFTWARE/HARDWARE USED

- *For simulations, we have used Proteus 8.12 software.*
- *For hardware implementations, we have designed a PCB for it.*
- *For PCB Designing, EasyEDA is used.*
- *For PCB Fabrication, the PCB Fabrication facility in BEL Lab is used.*

## Schematic



## Image of PCB



## Components List

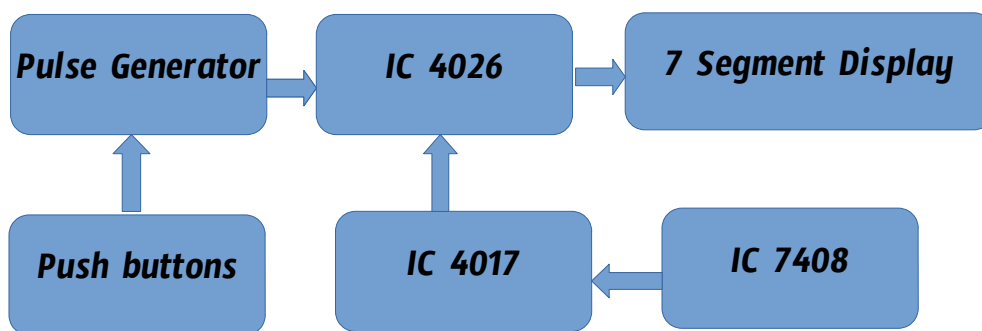
- IC 4026 – Decade Counter with 7 segment display driver – NOS – 4
- IC 4017 – Johnson Decade Counter – NOS – 3
- IC 7408 – Quad Input AND Gate – NOS – 1
- IC 555 – Timer IC – NOS – 1
- 7 segment Display – Common Cathode – NOS – 4
- Resistors – 220  $\Omega$ , 1K  $\Omega$ , 42K  $\Omega$ , 10K  $\Omega$  – NOS – 28, 1, 1, 2
- Capacitors – Electrolytic – 1000uF – NOS – 1
- Capacitors – Ceramic – 0.1uF – NOS – 1
- Push Buttons – SPST – NOS – 2

- **IN 4007 – PN Junction Diode – NOS - 1**

## **INTRODUCTION**

- *As we do our day-to-day activities, it's inevitable to check the time and manage our tasks so that we do it productively.*
- *For checking the time, there are numerous ways to do it such as analog clock, digital clock, wrist watch, smart watch.*
- *Considering the scope of this course, we have decided to go with Digital Clock.*
- *The Digital Clock comprises of four 7 segment displays to display hours and minutes, two push buttons to change time, 3 counter IC's to reset time, 4 Display driver IC's to drive the displays and an astable multivibrator circuit to supply the input clock with a pulse per minute.*

## **OPERATION**



- *The first operation is supplying the clock to the first 4026 IC. For this the 555 timer is configured as an astable multivibrator. The frequency of the clock is 0.01677 Hz with on-time of 30 sec, off-time of 30 sec.*
- *The 1<sup>st</sup> 4026 IC will start counting from 0 to 9 and it will drive the first 7 segment display. Once it finishes counting, it will output HIGH to a pin called Carry Out.*
- *The CO pin from 1<sup>st</sup> 4026 IC is used to supply the clock for 2<sup>nd</sup> 4026 IC. And this cycle goes on when a clock pulse is generated from the timer.*
- *For the clock of 3<sup>rd</sup> 4026 IC, the 1<sup>st</sup> 4017 IC is used. The 6<sup>th</sup> Output pin is*

*connected to one input of AND gate and the other is connected to the F pin of 3<sup>rd</sup> 4026.*

- In this way, we can reset the 2<sup>nd</sup> display to 0 when the minute reaches 60.*
- The same logic is implemented for the hour also.*
- A PN junction diode is used to prevent the backflow of current.*
- Two SPST push buttons are used to increment time. (The on-time of the output pulse is 30 seconds. During this period, we can't increment the time). For eliminating the debouncing effect, a pull-down resistor of 10K  $\Omega$  is used.*

## **RESULT**

- The four displays are being used to show the time in 24 hour format and the increment function is also working.*

## **CONCLUSION**

- As I have previously stated, this project is solely for learning purposes. This project is used to display the time in 24 hour format. With some modifications, we can display our local 12 hour format.*
- This project has opened some new doors for us including PCB Designing, Proteus Simulations.*

