

VISVESVARAYA TECHNOLOGICAL UNIVERSITY



MINI PROJECT REPORT ON

“7 SEGMENT DISPLAY”

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the mini project work entitled “**SEVEN SEGMENT DISPLAY**” carried out by **M.CHAITANYA GOPINADH(1NH18EC021)** bonafide students of Electronics and Communication Department , New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

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Date

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1.

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ACKNOWLEDGEMENT

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

We thank **Dr. Mohan Manghnani**, Chairman of **New Horizon Educational Institution**, for providing necessary infrastructure and creating good environment.

We also record here the constant encouragement and facilities extended to us by **Dr. Manjunatha**, Principal, NHCE and **Dr. Sanjeev Sharma**, head of the department of Electronics and Communication Engineering. We extend sincere gratitude to them.

We sincerely acknowledge the encouragement, timely help and guidance to us by our beloved guide **Ms. DHARMAMBAL.V** to complete the project within stipulated time successfully.

Finally, a note of thanks to the teaching and non-teaching staff of electronics and communication department for their co-operation extended to us, who helped us directly or indirectly in this successful completion of mini project.

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ABSTRACT

Now a days the device which people use for their daily uses were based on SEVEN SEGMENT DISPLAY. That is we always use digital watches which is a must to everyone. This is also observed in railway boards where we can see the boards which is displayed using seven segment display. The complicated display is derived from the simple display circuit. 4026 is the counter IC , and the 555 timer is used to generate clock signal. The interfacing between is adapted by the IC.

Seven segment display plays important role in the upcoming technology. In designing the projects we can use two types of displays. One of those displays are common cathode and other one is common anode. In railway stations, busses, aeroplane these types of displays are used to tell information about their travelling. This plays an important role in our day to day life. Clock signal can be generated in different ways based on the circuit designed.

In this we also use LEDs which indicates the light when it starts working. The shapes of LED segments tend to be simple rectangle which reflects how they have been moulded. High common recognition factor of the seven segment display, which is comparatively high visual contrast has been obtained by such displays.

There is one more main component which is 555 timer IC which is used to generate clock signal by switching on the push button.

Keywords :

- 1) IC 4026**
- 2) 555 timer**
- 3) LED**
- 4) Bread board**
- 5) Pot**

CHAPTER-1

INTRODUCTION

Seven segment displays is the representation of figures that are found in patents before 1903 Carl Kinsley invented a method of telegraphically transmitting alphabets and numerals which are printed on tape in a segmented format.

In 1910, a Seven Segment Display is illuminated by incandescent bulbs which are used on a power plant boiler room signal panel. They are also used to show the dialed telephone number for the operators during the transition from manual to automatic telephone dialing. They did not get any widespread use of it until the invention of LEDs late in 1970s.

These are widely used in many electrical applications including alarm clocks, timers and scales. A seven segment display is an electronic device which can be used for displaying numerals and some letters. Different numerals and different letters can be represented by connecting the different pins on the display to the battery, that turns on the LEDs in parallel.

This activity gives introduction how to use a Seven segment display using a breadboard, battery, resistors and some wires.

LEDs are also used in the experiment which indicates the light when it starts working. The shapes of LED segments tend to be simple rectangles which reflect the fact that they have to be physically moulded to the shape that is actually required.

However, high common recognition factor of the Seven segment displays, the comparatively high visual contrast has been obtained by such displays that are related to dot matrix digits which makes the Seven segment as multiple digit on LCD screens that are very common on basic calculators.

The Seven segment display has been inspired many type designers to produce the typefaces reminiscent of that display which is more legible, such as NEW ALPHABET etc.

CHAPTER-2

COMPONENTS REQUIRED:

- Bread Board
- 555 timer IC
- 4026IC
- Common cathode Seven segment display
- Resistors-10(k)
- Resistor-1(k)
- Capacitor- 10uf
- Battery-9v
- Connecting wires
- LED
- 100K Variable pot

CHAPTER-3

LITERATURE SURVEY

1.Breadboard:

A breadboard is a construction base for the prototyping of electronics. Originally the word is referred to a literal breadboard, a polished piece of wood which is used for slicing the bread. In the 1970s the solderless breadboard came into picture and nowadays it plays a very important role in electronics.

A stripboard and some sort of similar prototyping printed circuit boards, which are used to build semi-permanent soldered prototypes, which cannot be easily refused .A variety of electronic systems can be prototyped by using this breadboards.

FIG-3.1



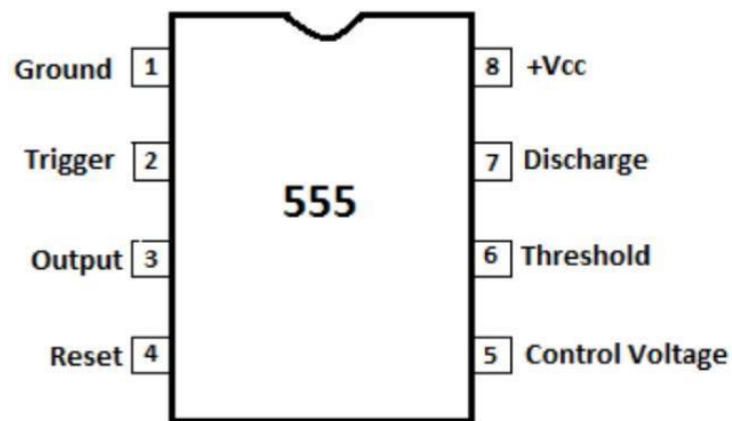
555 timer IC:

The 555 timer IC is a integrated circuit which is used in a variety of timer , pulse generation and oscillator applications. The 555 timer IC can be used to provide time delays, as an oscillator and also as a flip-flop element.

555 timer IC was introduced in 1972 by Signetics , the 555 timer is still in widespread used due to its very low cost , easy to use , and for its stability. Which is now made by many companies in the original form of bipolar and at low – power CMOS technologies.

555 timer can also be operated as an electronic oscillator. 555 timer uses include LED and lamp flashers, pulse generation and etc.,

FIG-3.2



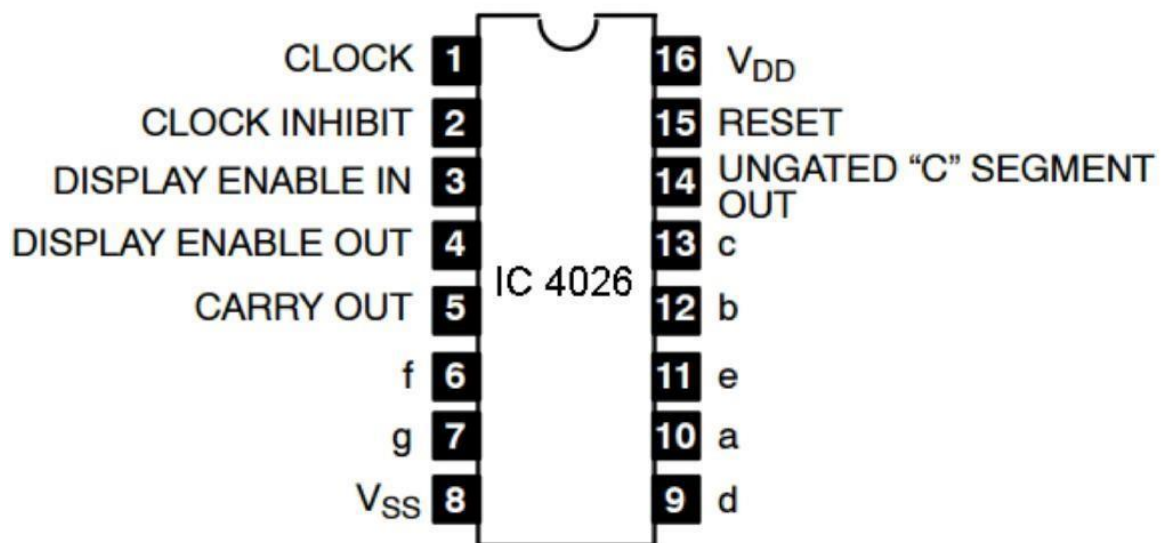
4026IC:

The 4026IC is a decade counter which is a integrated circuit (IC) with decoded outputs for driving a common cathode Seven segment LED display. The IC4026 which is a 7 segment driver helps to use the seven segment display with ease.

4026IC is a 4000 series IC which can be operated at a low power. It is a decade counter which counts from 0 to 9. And by using this IC we can display the numbers on the seven segment display.

IC4026 is a Johnson counter IC which contains 5 stages of Johnson decade counter which is used to convert the Johnson code to a 7 segment decoded output

FIG-3.3



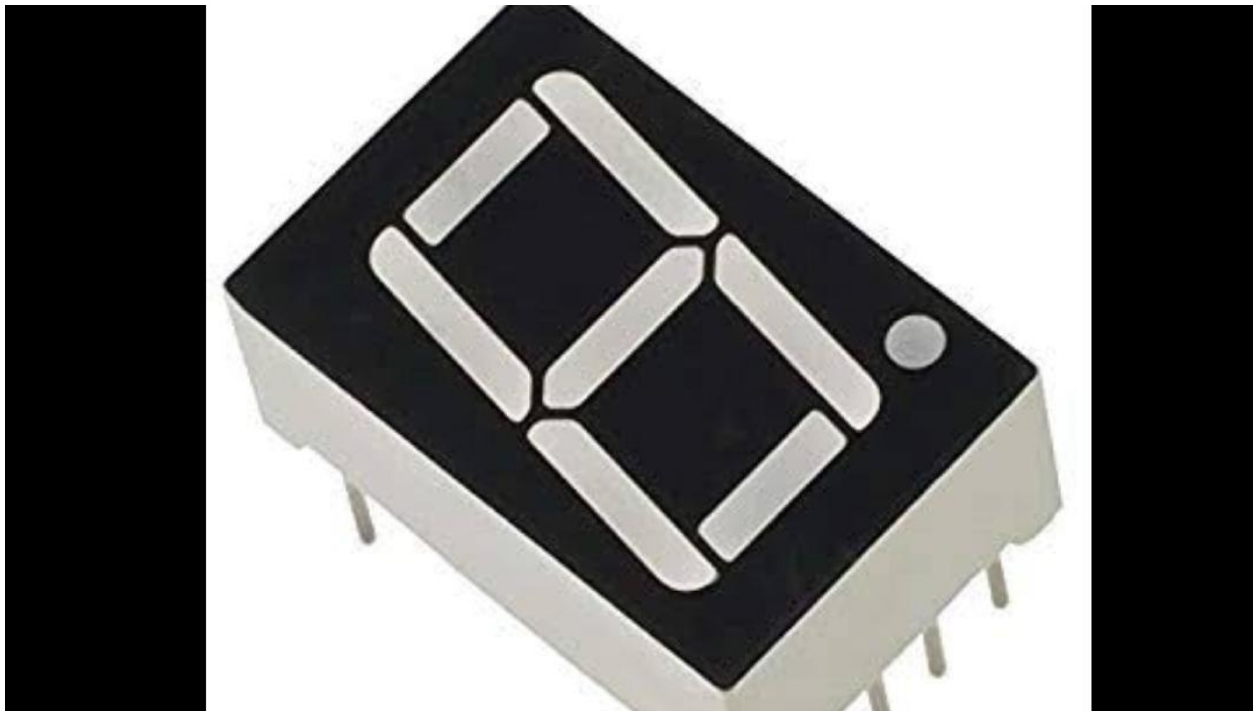
Seven segment display:

A seven-segment display is a form of electronic display device which is used for displaying decimal numerals which is an alternative to the more complex dot matrix displays.

Seven segment displays are widely used in digital clocks, electronic meters and basic calculators and many more uses which displays numerical information. However, the high common recognition factor of seven segment display and it has comparatively high visual contrast.

The seven segments are arranged in a form of rectangle of 2 vertical segments on each side with one horizontal segment on the top, middle and bottom respectively.

FIG-3.4



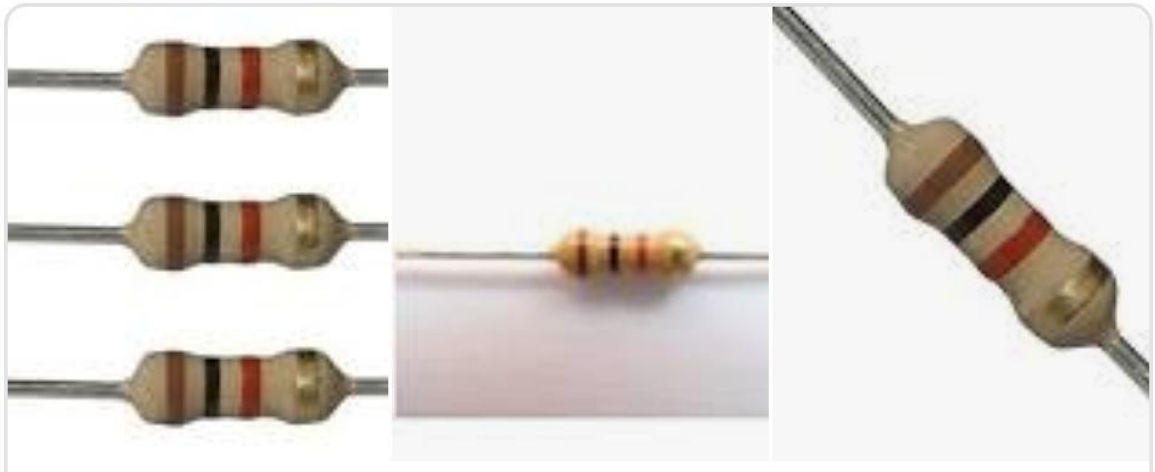
Resistors:

A resistor is a passive two terminal electrical component which implements electrical resistance as a circuit element. Resistors are used to reduce current flow, adjust signal levels, to divide voltages bias active elements and many in electronic circuits.

Resistor (10k):

10k resistors are widely used in PCBs and perf boards .10k resistors are the resistors which makes excellent pull-ups and pull-downs and also current limiters. This is because of the thin leads which we don't prefer using this in general breadboards.

FIG-3.5



Resistor (1k):

1k resistor reduces the flow of current

It is a passive device.

Carbon composition resistors which are formed by a solid cylindrical resistive element.



Capacitor:

A capacitor which is originally known as a condenser. It is a passive two-terminal electrical component which is used to store energy electrostatically at any electric field.

The forms of practical capacitors vary widely from each other. But all it contains at least two electrical conductors which are separated by a dielectric that is an insulator

FIG-3.6



Battery:

Batteries are the collection of one or more cells whose chemical reactions create the flow of electrons in the circuit. All the batteries are basically made up of three basic components which are anode which has negative terminal, a cathode which has a positive terminal and some kind of electrolyte which chemically reacts with both anode and cathode.

When a positive and negative terminal of a battery is connected to a circuit, a chemical reaction takes place between the negative terminal and electrolyte. When the material in cathode and anode is consumed then it cannot be used in further reactions.

There are two types of batteries:

1.Primary batteries:

A primary battery is a portable voltaic cell that cannot be rechargeable. These are the batteries which cannot be reused

2.Secondary batteries:

A secondary battery which can be charged, discharged into a load, and can be recharged many times, as opposed to a disposable which is supplied fully charged and discarded after use

FIG-3.7



LED:

A light-emitting diode is a semi conductor light source which emits the light when current flows through it. In the semi conductor electrons will recombine with electron holes, which releases energy in the form of photons.

The colour of the light that is corresponding to the energy of photons is determined by the energy required for the electrons to cross the band gap of the semi conductor. It conducts white light which is obtained by using multiple semi conductors are a layer of light-emitting phosphor on the semi conductor device .

FIG-3.8

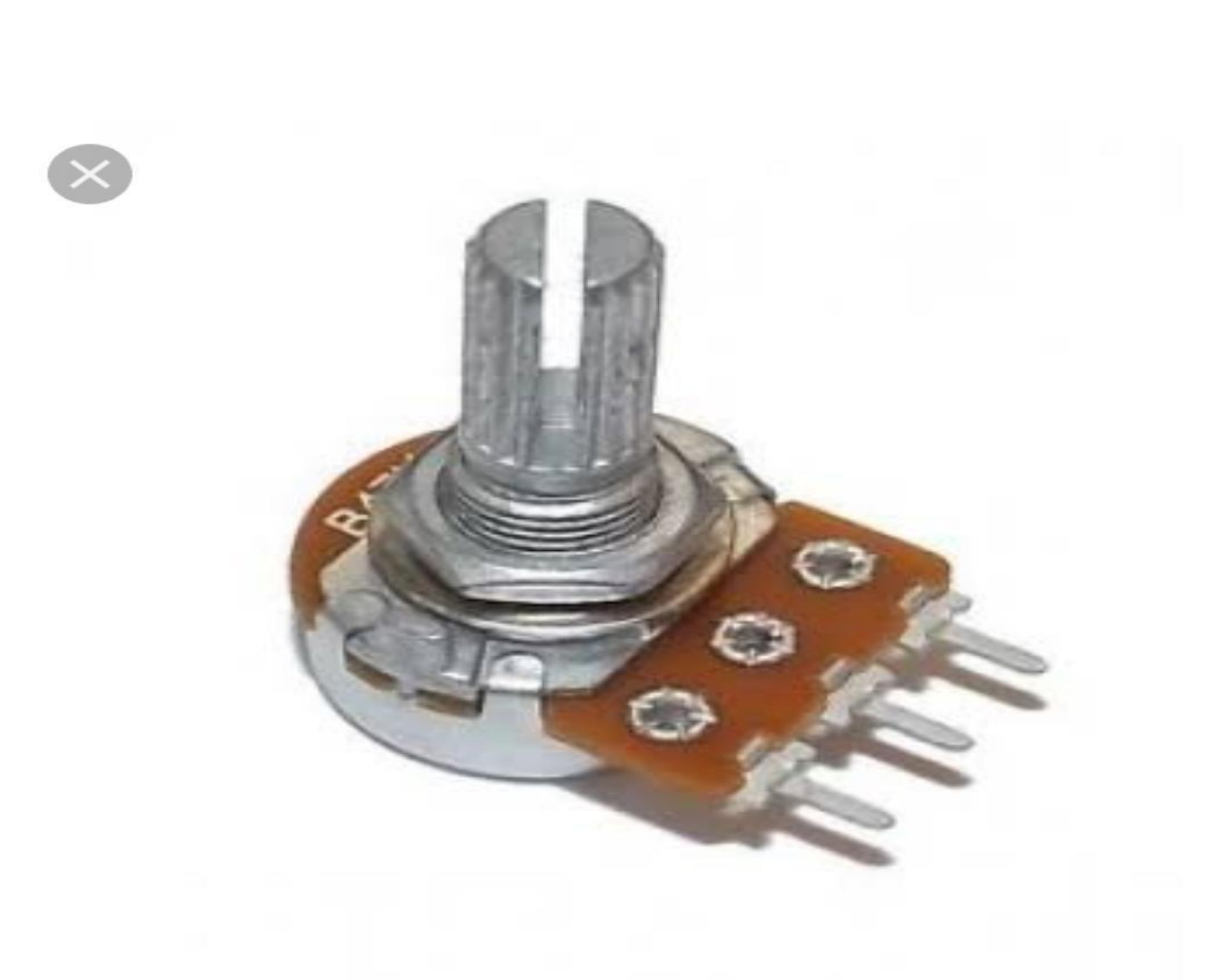


100 K VARIABLE RESISTIVE POT:

Due to this we can vary the resistance value. Using this POT we can vary the glow timing of the LED. POT is a manually adjustable variable resistor which contains 3 terminals. The most common form of this POT is that it has single turn rotary potmeter.

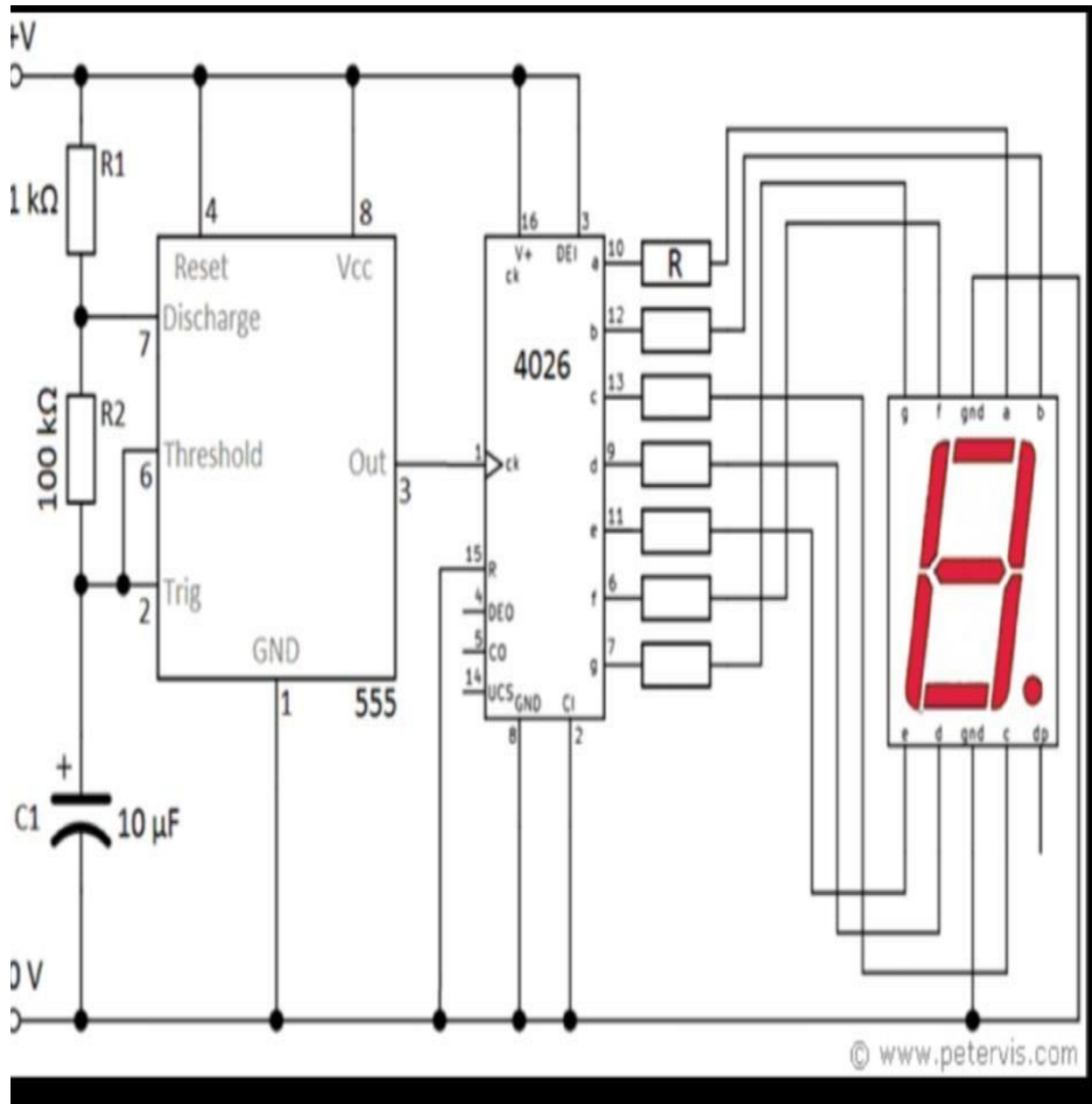
This type of POT is also used in audio volume control that is in logarithmic taper and also it is used in many more applications. It consists of two terminals out of which are connected to both the ends of the resistive elements and it also contains third terminal which is in contact with the wiper, which is moving over the resistive element. Potentiometer generally functions as a variable voltage divider. The two resistors generally will be in series and the wiper position determines the resistance ratio.

FIG-3.9



CHAPTER-4

BLOCK DIAGRAM:



CHAPTER-5

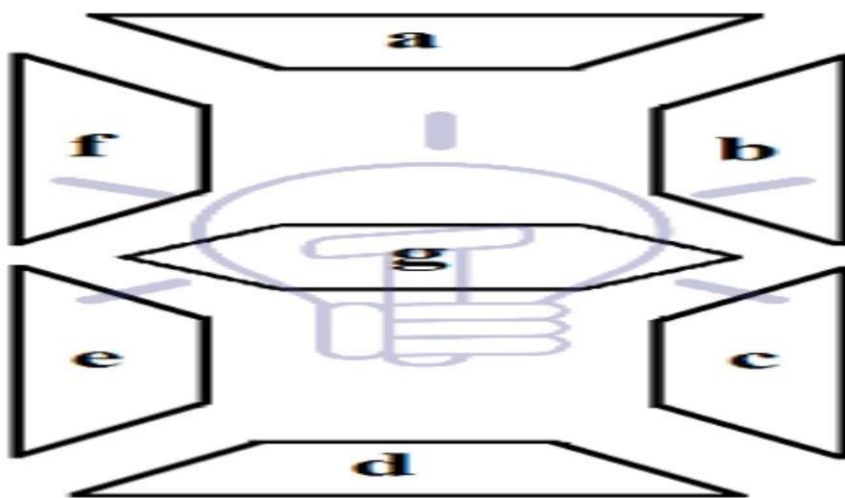
PROJECT DESCRIPTION

The circuit of seven segment display is quite easy and self-explanatory, in this we have interfaced the 7 segment to the IC4026, pin 4,5,14 are left open as we have not used then, we will use pin 15 to reset the counter to which we will take the help of PUSH button switch. Pin 2 is kept at LOW to avoid the freezing and Pin 13 is kept at HIGH to enable the IC.

There is one more main component in the circuit other than IC4026 that is 555 timer IC. 555 timer IC which is used to provide the clock pulse by switching the push button, whenever we press the push button the counter will advance by ONE. We will use 555 timer IC in monostable state .

There is one more application that is in IC 4026 in which we can extend the counting limit up to infinity. In this using experiment by using one IC we can control one seven segment display.

In this experiment we use logic two input AND gate (IC7408), this we use in this circuit because to reset the hours time .



OUTPUT CAN BE OBTAINED BASED ON THE FOLLOWING TRUTH TABLE:

Truth table:

| INPUT | | | | | OUTPUT | | | | | | |
|--------|---|---|---|---|--------|---|---|---|---|---|---|
| Digits | A | B | C | D | a | b | c | d | e | f | g |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| 3 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| 4 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| 5 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 6 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 7 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 8 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 9 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |

BLOCK DESCRIPTION

PIN numbers:

- Pin numbers 1,2,,3,4,5,6,7,9,10,11 are used as output pins.
- Pin 8 is taken as ground(GND) and Pin 16 is taken as 0 source (VCC).
- Pin 15 is used to reset, when we connect pin 15 is connected to HIGH signal which is used to count reset to zero.
- Pin 14 is used to input the clock.
- Pin 13 is used as enable clock, when this pin is connected to VCC the pulse in this IC will be ignored, while doing the normal operation we should ground the pin.
- Pin 12 is used to carry out the function

There are two types of seven-segment displays.

1. Common Cathode:

In 7 segment display all the cathodes of the LED's are connected together in order to form a common terminal. So that it should be connected to GND or logic 0 to get a proper output.

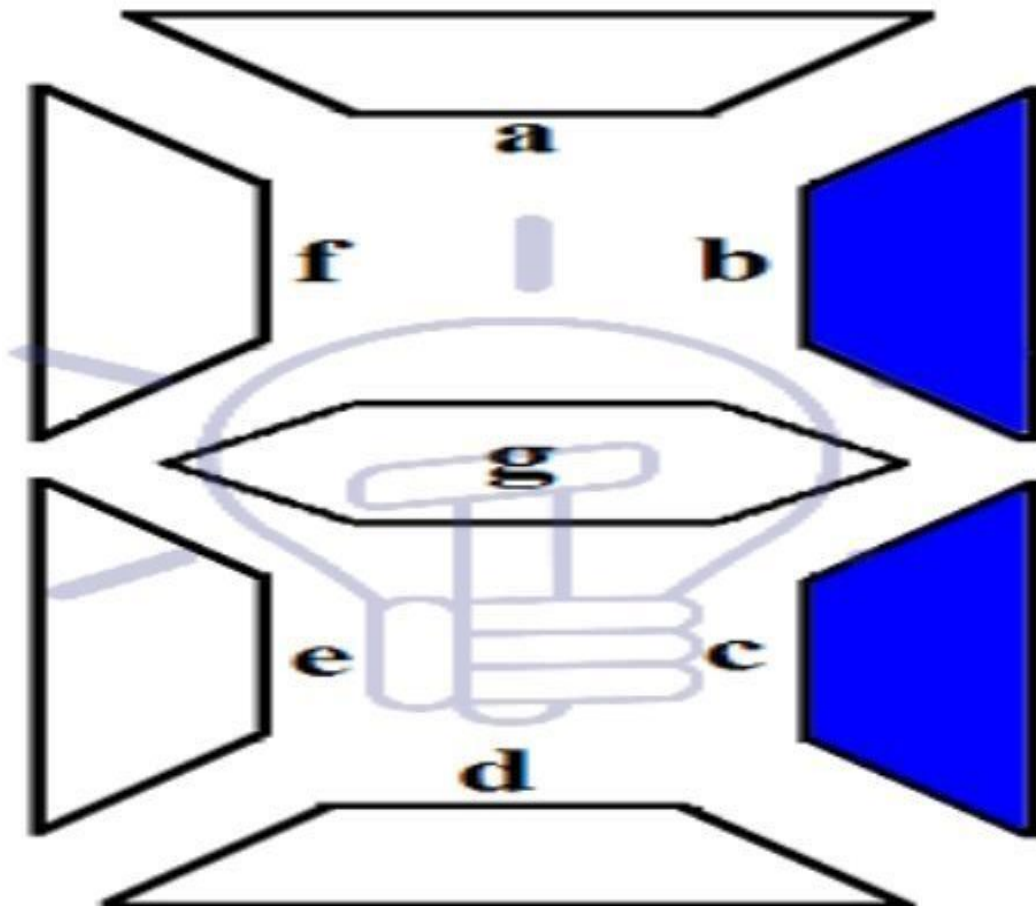
2. Common Anode:

Common Anode is a type of 7 segment display in which all the terminals of LED's should be connected together in order to form a common Anode terminal. To get perfect output we should connect the terminal to VCC or logic 1 during its operation.

WORKING OF SEVEN SEGMENT DISPLAY FOR ALL DIGITS

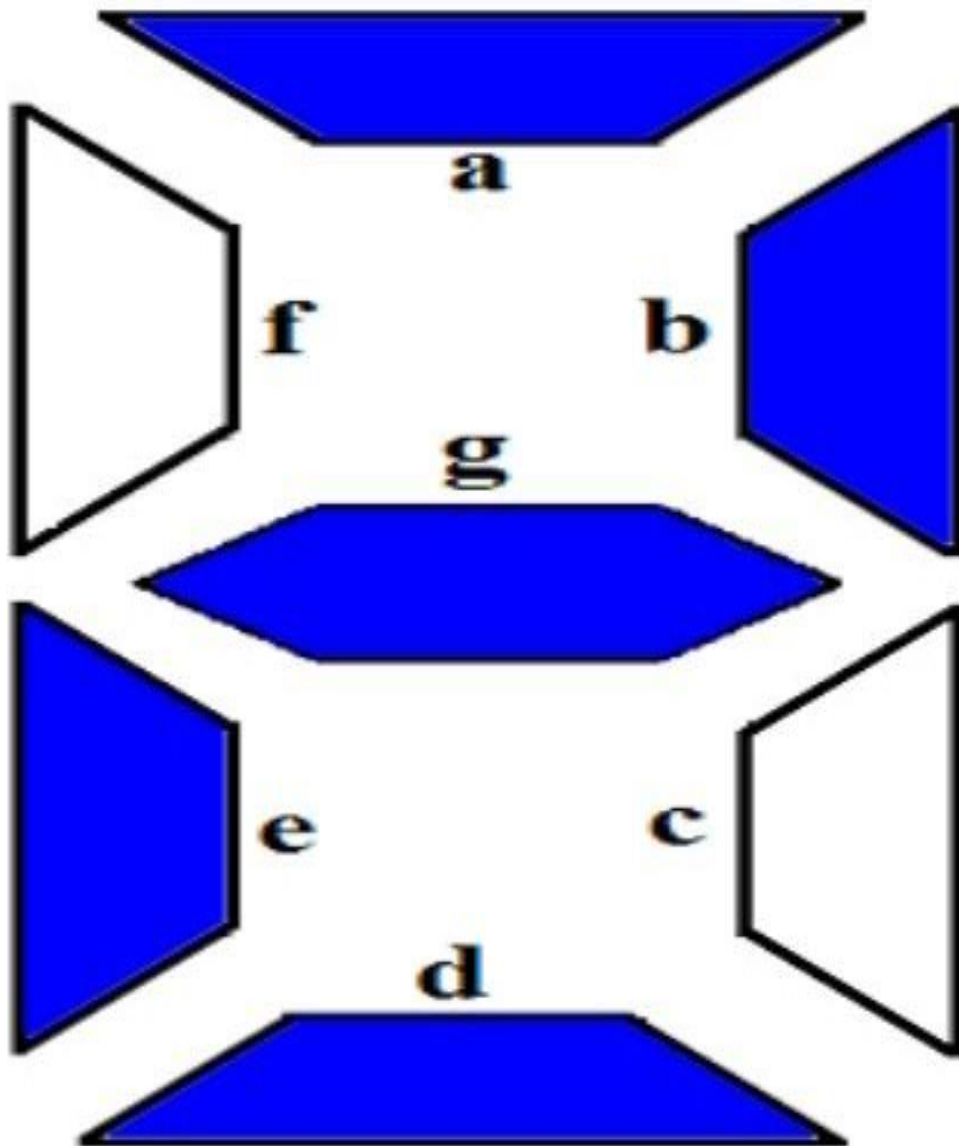
Digit-1:

To display the digit 1 in seven segment display, we need to turn the segments b, c and we should turn off the LED segments a, d, e, f and g . After doing this the configuration will result in the display as shown in the figure .



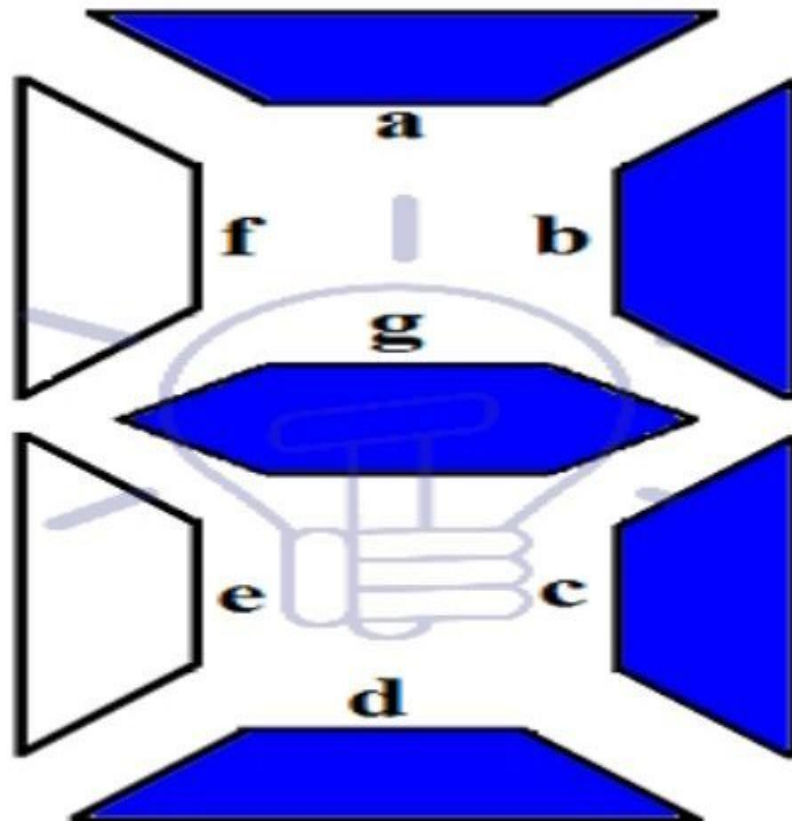
Digit-2:

To display the digit-2 in seven segment display we need to turn the segments a, b, d, e, and g. And we should turn off the LED segments c, f. By doing this configuration we can see the digit-2 as shown in the figure .



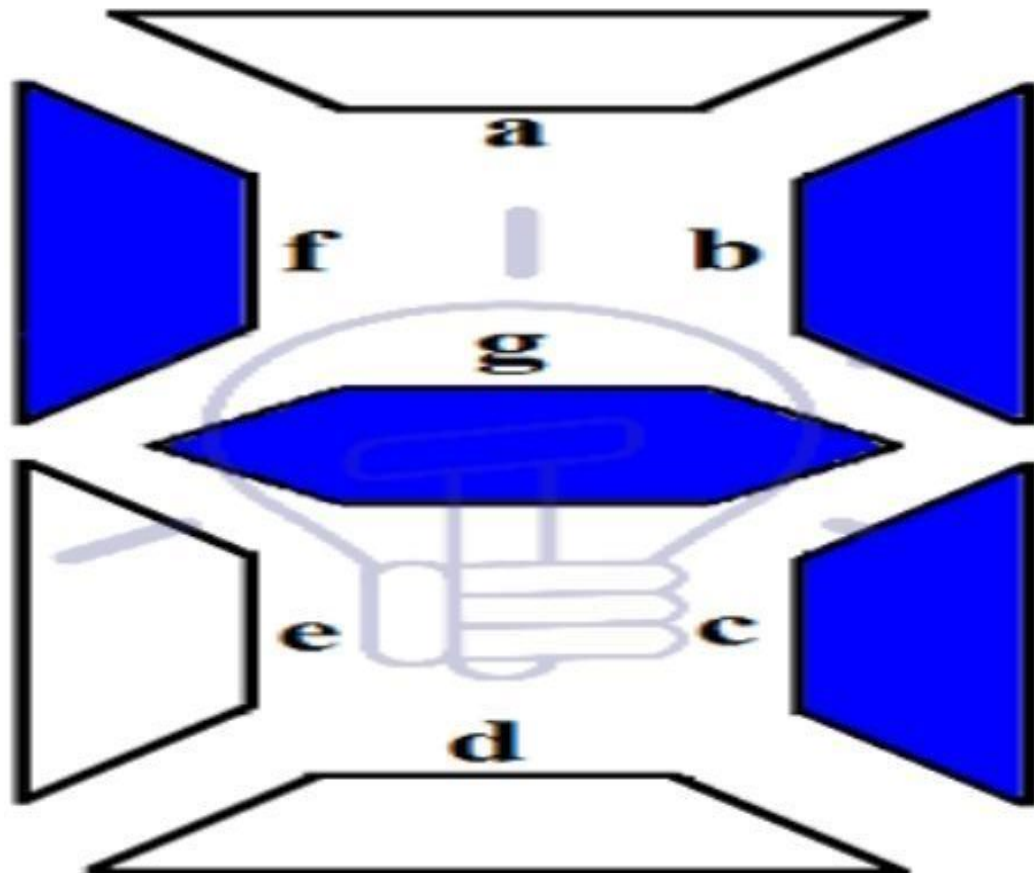
Digit-3:

To display the digit-3 we should turn on the segment a, b, c, d and g. And we should turn off the LED segments e and f. By doing this configuration this will result in the display of digit 3 as shown in the figure.



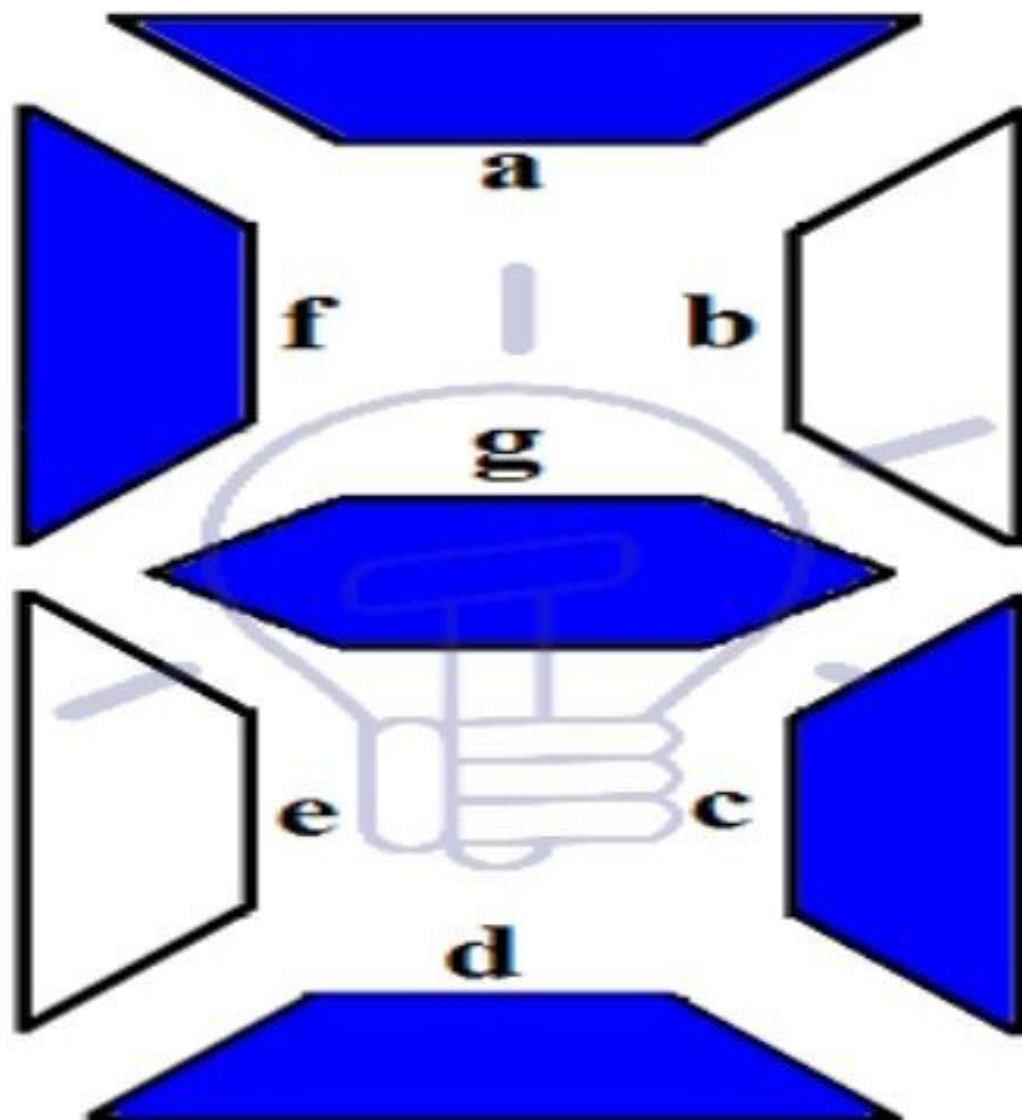
Digit-4:

TO display the digit-4 we should turn on the segments of the LED of b, c, f, g. And we should turn off the LED segments a, d, e. By doing this process we can see the output which displays the digit-4.



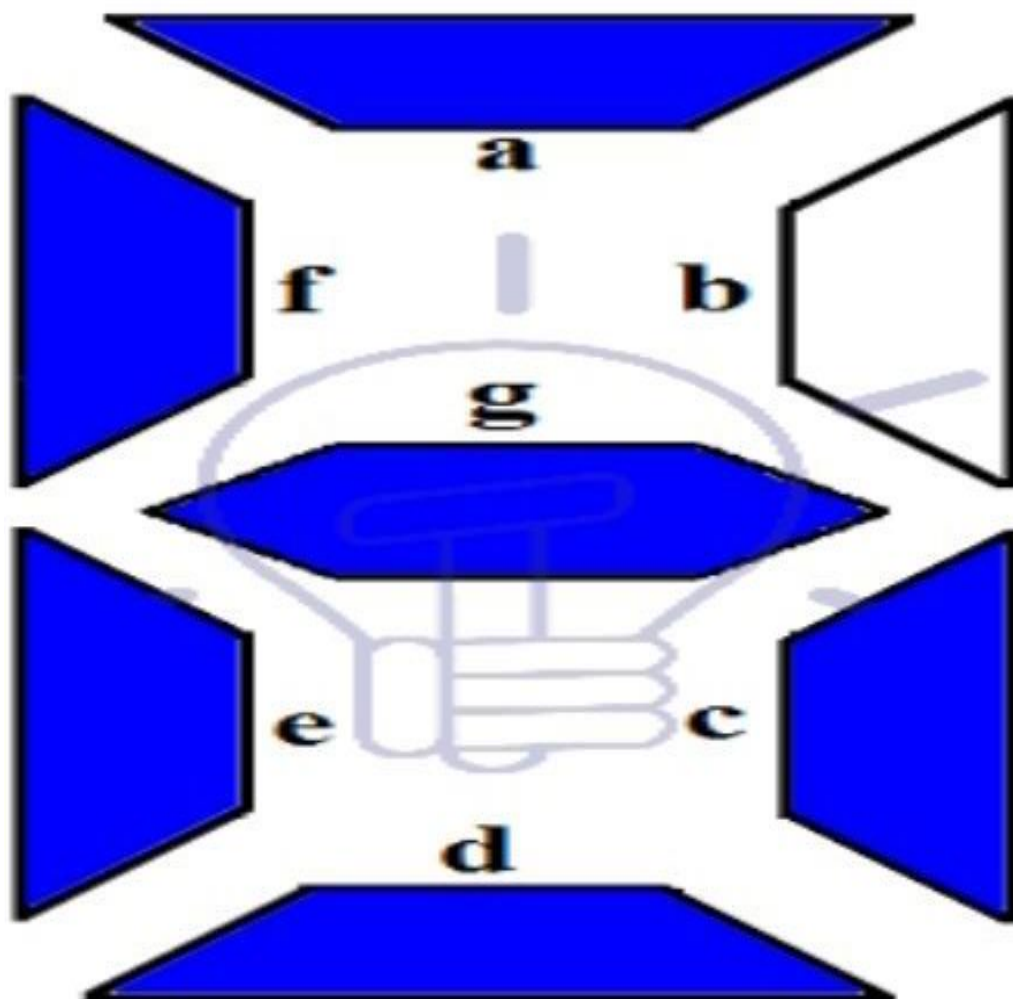
Digit-5:

To display the digit 5 in the LED segment, we should turn on the a, c, d, f, and g. And we should turn off the LED segment b. By doing this process we can see the output. Which displays the digit- 5



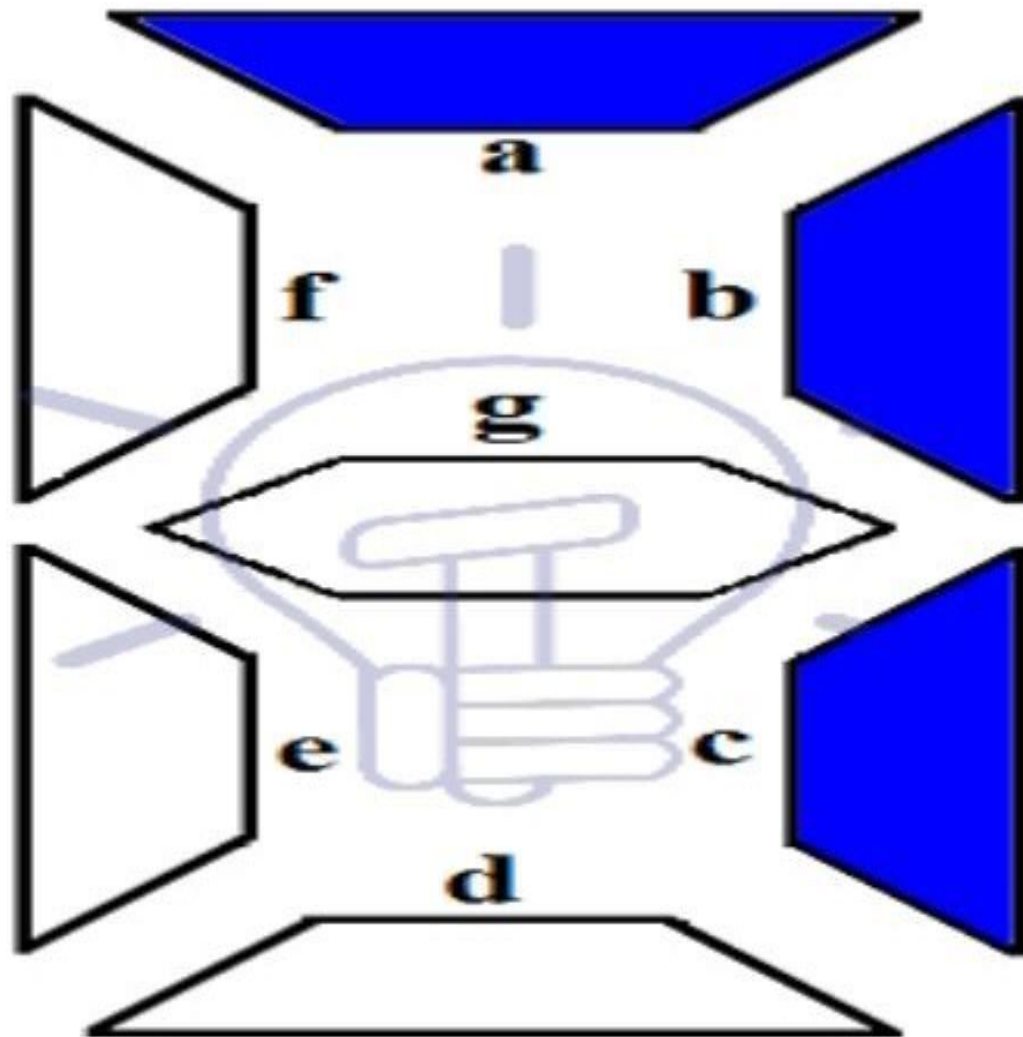
Digit-6:

To display the digit-6 on the LED segment we should turn on a, c, d, e, f, g. and we should turn off the LED segment b. By doing this we can see the output which displays the digit-6.



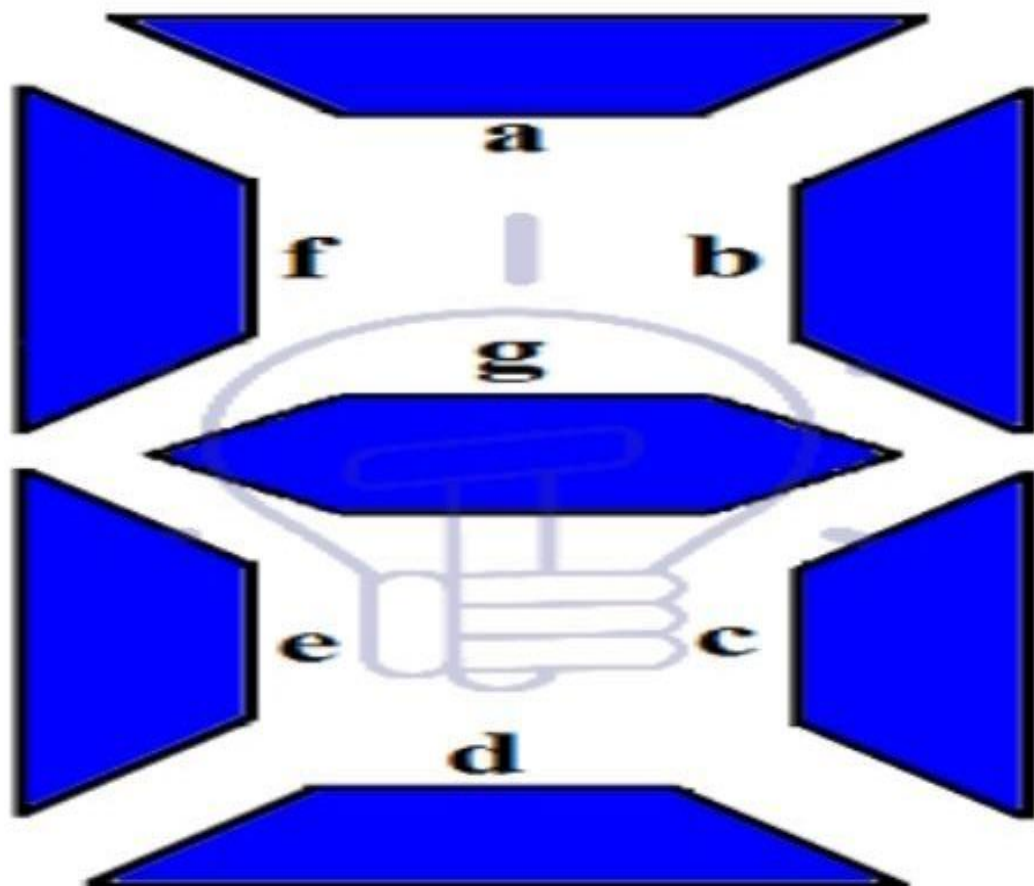
Digit-7:

To display the digit-7 on the seven segment display we should turn on the LED segments a, b, c. And we should turn off the LED segments d, e, f, and g. By doing this configuration we can see the output that displays as digit-7.



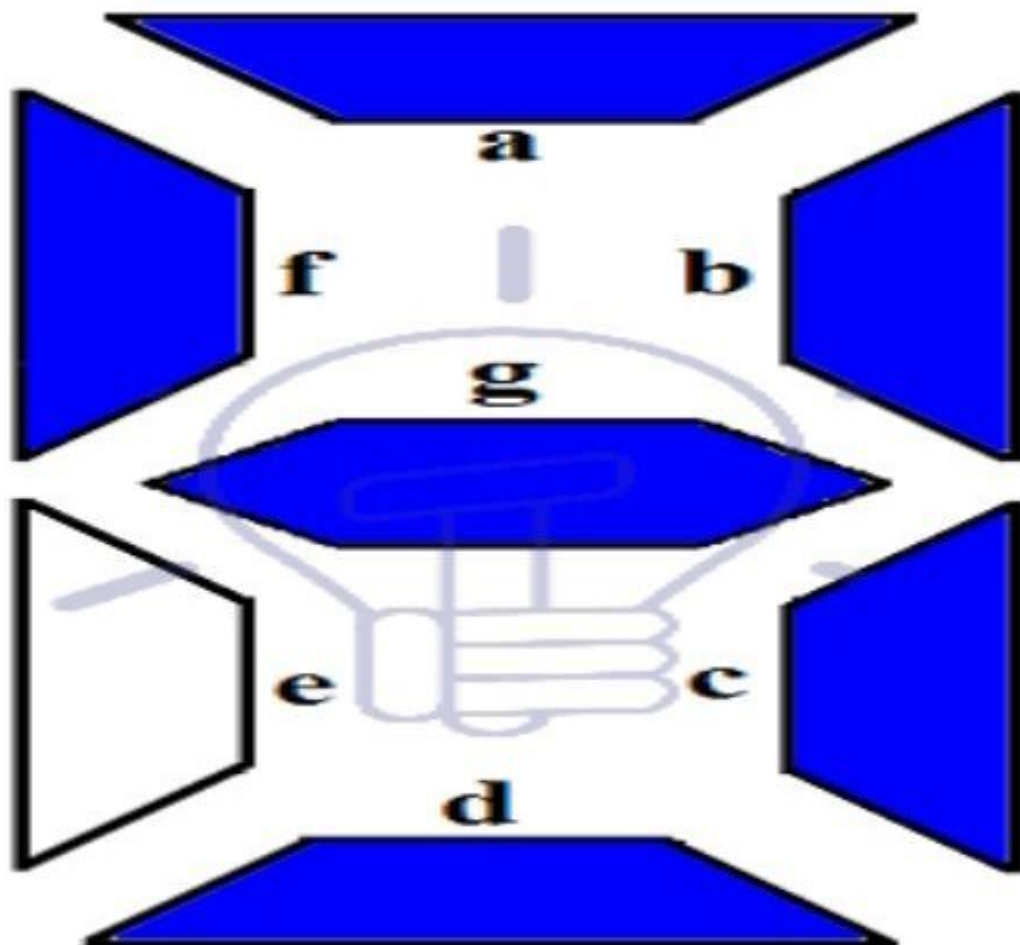
Digit-8:

To display the digit-8 on the seven segment display we should turn on the LED segments a, b, c, d, e, f, g. And there is no need of turning off any segment. By doing this we can get the output as digit-8.



Digit-9:

To display the digit 9 on the seven segment display we should turn on the segments a, b, c, d, f, g. And we should turn off the LED segment e. By doing this configuration which results in the display of digit 9.



CHAPTER-6

RESULTS

- By this experiment we can test different combination of switches, the display we observe is that we can see the digits from 0 to 9 by switching the inputs on and off
- The combination of each and every inputs and outputs will be unique.
- By doing this we can even display the letters from a to f.
- In this project counting of binary coded decimals will happen.
- We can vary the count time by varying the pot.
- Count of digits can be done by clock signal and counter IC.

APPLICATIONS:

1. These displays are commonly used in :

a) digital calculators

b) electronic meters

c) odometers and clock radios.

2. For seven segment display we always use LEDS because the consumption is very low.

3. The main application of seven segment is we use this in watches

4. We use either of Anode or Cathode during the construction of seven segment display

