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Mumbai – 400 022.

CERTIFICATE

This is to certify that Mr. TANAY SHETTY Roll No. SCS2324060 Has successfully completed the necessary course of experiments in the subject of Internet Of Things during the academic year **2023 – 2024** complying with the requirements of **University of Mumbai**, for the course of **S.Y.BSc. Computer Science [Semester-3]**

Prof. In-Charge
Mr. B.M Wagle
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Examination Date:
Examiner's Signature & Date:

Head of the Department
Prof. Manoj Singh

College Seal
And
Date

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Practical No:1

Write a program to blink LEDs connected to GPIO20, GPIO21

Code:

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

GPIO.setup(20,GPIO.OUT)
GPIO.setup(21,GPIO.OUT)

while True:

    GPIO.output(20,1)

    time.sleep(0.2)

    GPIO.output(20,0)

    time.sleep(0.2)

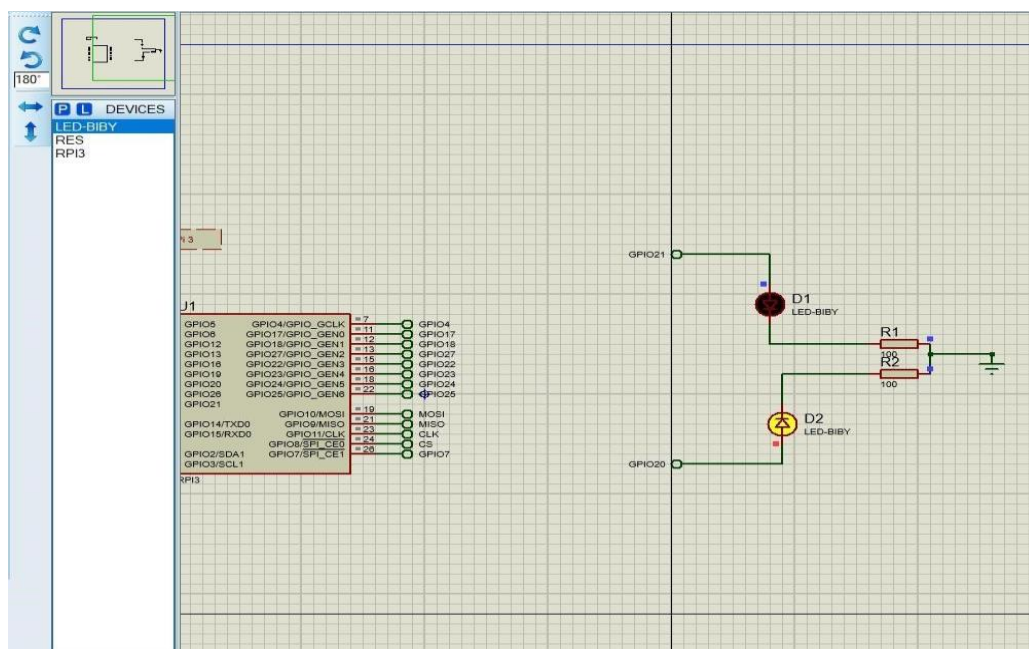
    GPIO.output(21,1)

    time.sleep(0.2)

    GPIO.output(21,0)

    time.sleep(0.2)
```

Output:



Practical No: 2

Write a program to detect Key Pressed (keys are connected to GPIO16, GPIO19)

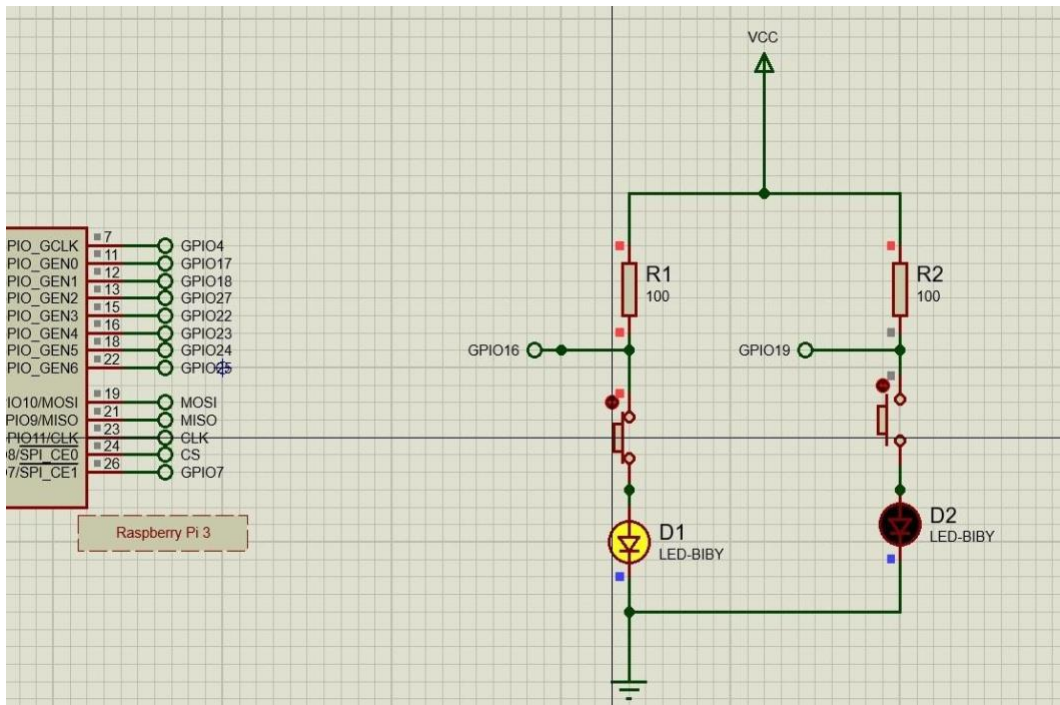
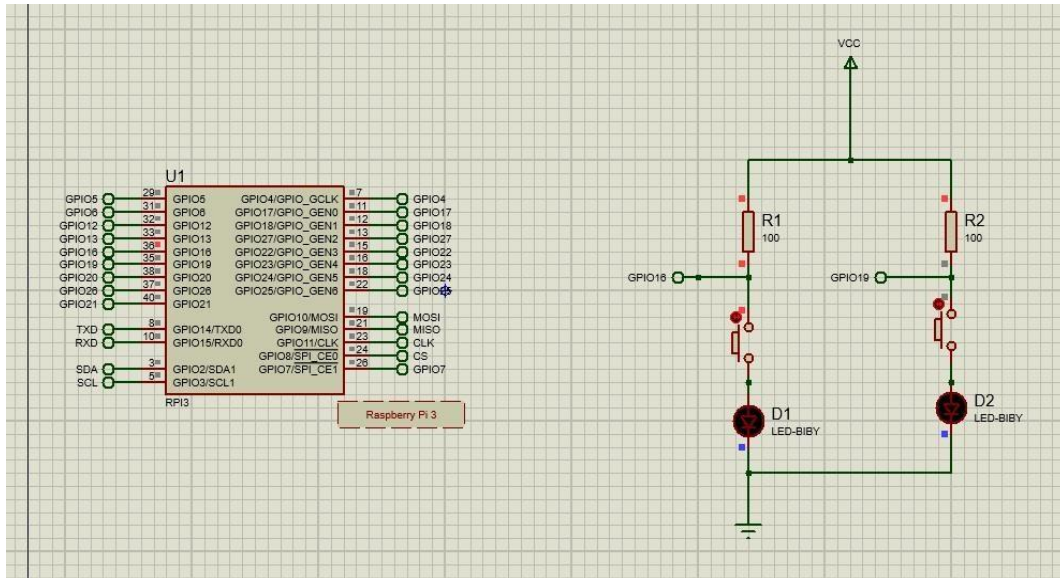
Code:

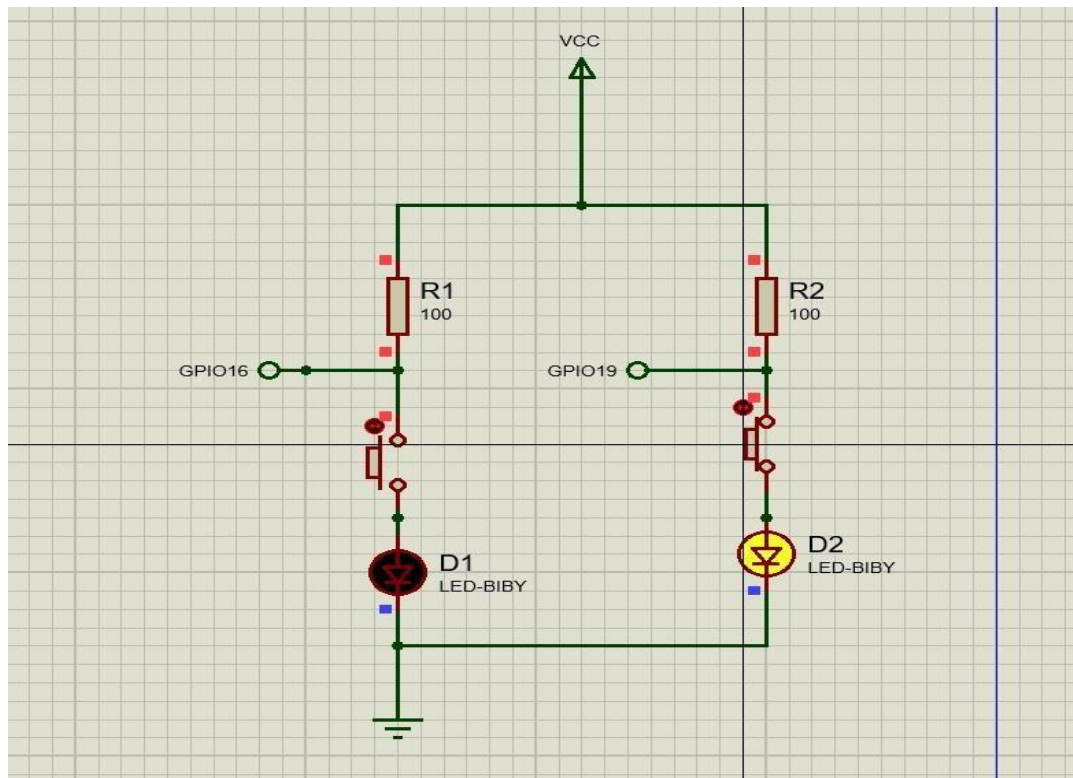
```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)
GPIO.setup(19,GPIO.OUT)
GPIO.setup(16,GPIO.OUT)

while True:
    reading = GPIO.input(19)
    if reading == 0:
        GPIO.output(19,1)
        print("Second Button Pressed")
    else:
        GPIO.output(19,0)
        Time.sleep(1)
        reading1= GPIO.input(16)
        if reading1 == 0:
            GPIO.output(16,1)
            print("First Button Pressed")
        else:
            GPIO.output(16,0)
            time.sleep(1)
```

Output:





Simulation Log

Message

- PROSPICE 8.08.00 (Build 29194) (C) Labcenter Electronics 1993-2020.
- Loaded netlist 'C:\Users\DELL\AppData\Local\Temp\LISA6019.SDF' for design 'PRAC2.pdsprj'
- [VSMPY] Second Button Pressed
- [VSMPY] First Button Pressed
- [VSMPY] Second Button Pressed
- [VSMPY] First Button Pressed
- [VSMPY] Second Button Pressed
- [VSMPY] First Button Pressed
- [VSMPY] Second Button Pressed
- [VSMPY] First Button Pressed
- [VSMPY] Second Button Pressed
- [VSMPY] First Button Pressed
- [VSMPY] Second Button Pressed

Practical No: 3

Write a program to display 8x8 matrix-A

Code:

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

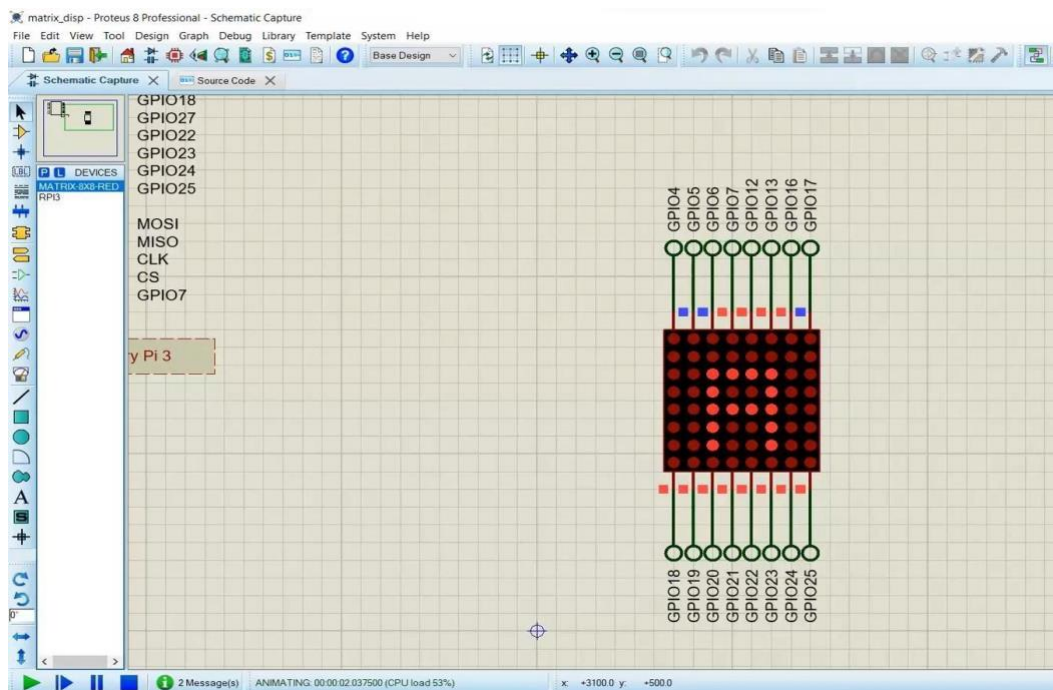
cols=[4,5,6,7,12,13,16,17]
rows=[18,19,20,21,22,23,24,25] n=8
refresh_rate=1/360

for i in range(n):
    GPIO.setup(rows[i],GPIO.OUT)
    GPIO.setup(cols[i],GPIO.OUT)

for i in range(n):
    GPIO.output(cols[i],0)
    GPIO.output(rows[i],1)
    A1=[6,7,12,13,20]
    A2=[6,13,21]
    A3=[6,7,12,13, 22]
    A4=[6,13,23]
    A5=[6,13,24]
    A=[A1,A2,A3,A4,A5]

while True:
    for An in A:
        for l in range(n):
            GPIO.output(cols[l],0)
            GPIO.output(rows[l],1)
        for p in An:
            GPIO.output(p,1)
            if p>17:
                GPIO.output(p,0)
            time.sleep(refresh_rate)
```

Output:



Practical No: 4

Write a program to generate sound by inputting pitch and duration

Code:

```
import RPi.GPIO as x

import time

x.setmode(x.BCM)

x.setup(4,x.OUT)

note=240

t=(1/note)/2

while True:

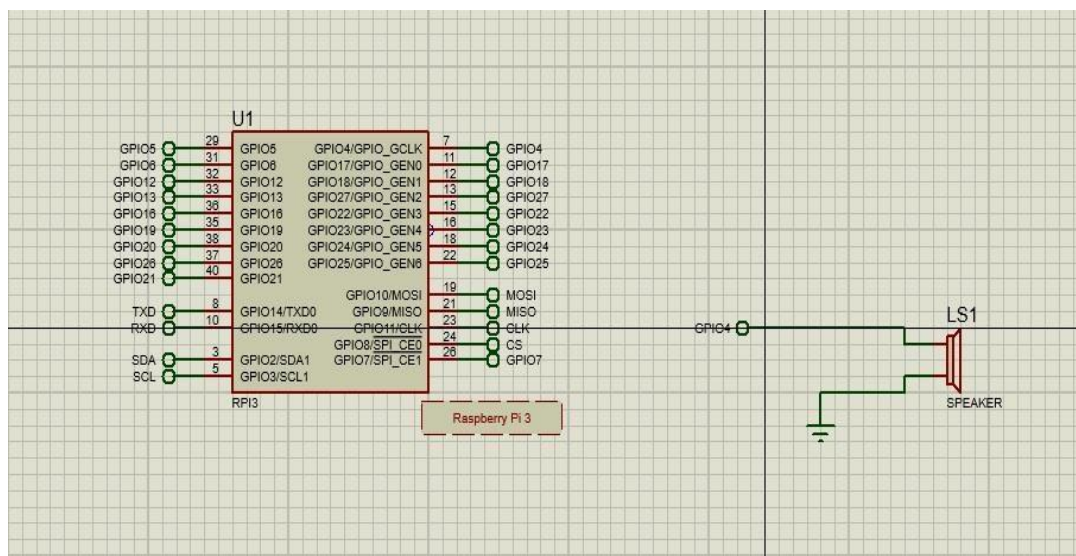
    x.output(4,1)

    time.sleep(t)

    x.output(4,0)

    time.sleep(t)
```

Output:



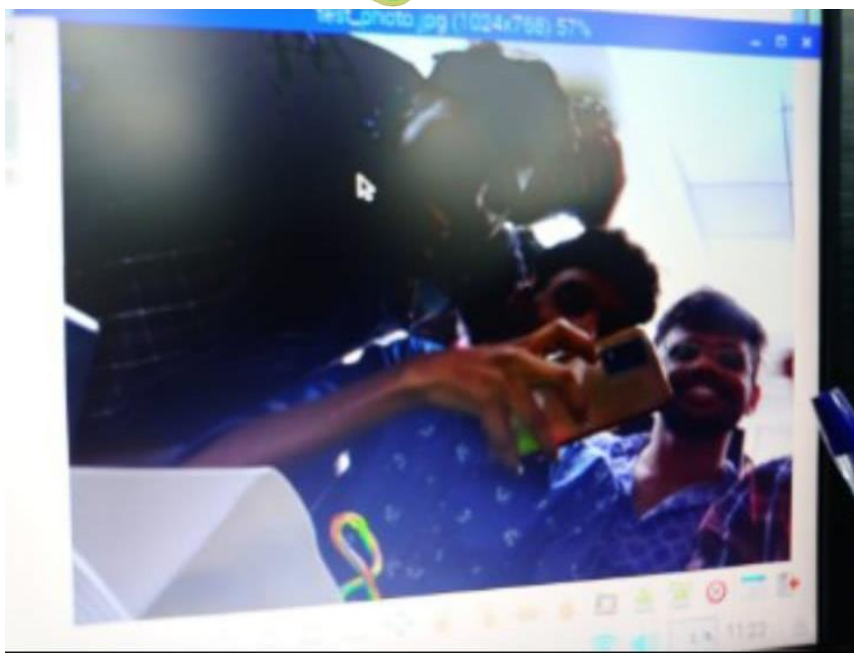
Practical No: 5

Write a program to take image using CSI camera.

Code:

```
from picamera import PiCamera
from time import sleep
camera = PiCamera()
camera.resolution=(1024,768)
camera.start_preview()
sleep(2)
camera.capture('test_photo.jpg')
```

Output:



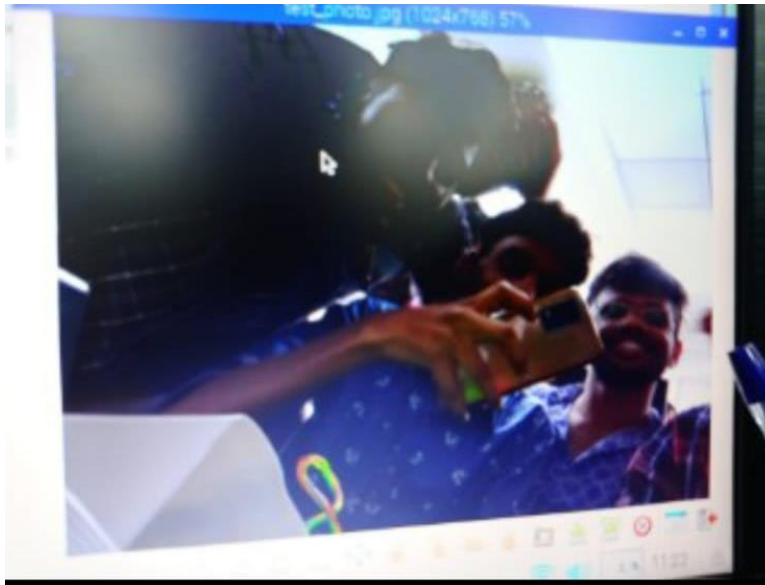
Practical No : 6

Write a program to take video using CSI Camera

Code:

```
import picamera  
camera=picamera.PiCamera()  
camera.resolution=(640,480)  
camera.start_recording('test_video.h264')  
camera.wait_recording(15)  
camera.stop_recording()  
print('finished')
```

Output:



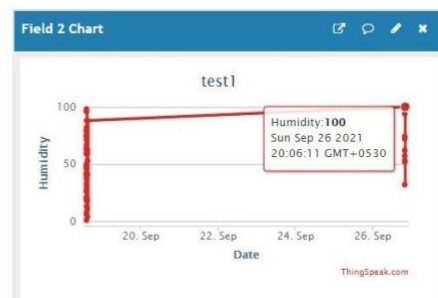
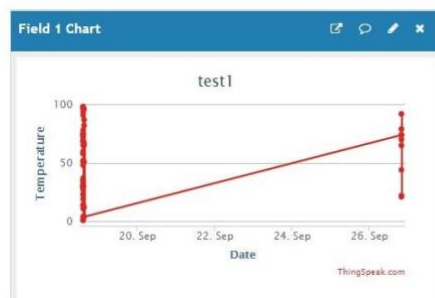
Practical No: 7

Write a program to connect to thingspeak and display temperature and humidity

Code:

```
import urllib.request as urllib2
import random
import time
key = "YO0BJ276CPTIEWPN"
url=f"https://thingspeak.com/update?api_key={key}"
while True:
    temp = random.randint(1, 100)
    humi = random.randint(1, 100)
    finalurl =f"{url}&field1={temp}&field2={humi}"
    s =urllib2.urlopen(finalurl)
    s.close()
    time.sleep(1)
```

Output:



Practical No: 8

Write a program to tweet using thinkspeak if temperature>70

Code:

```
import urllib.request as urllib2
import requests
import random
import time
key="QEQL9T6RYICCOB"
URL=f"https://api.thingspeak.com/update?api_key={key}"
Tweetkey="TAFZUQBD12U5FCIO"
TweetURL="https://api.thingspeak.com/apps/thingtweet/1/statuses/update"
while True:
    choice=input("Enter X to exit or any other key to enter
    data: ") if choice == "X":
        break
    temp = random.randint(1, 100)
    humi = random.randint(1, 100)
    if temp > 40:
        status="Alert Temperature is above 70 C"
        data={'api_key':Tweetkey,'status':status}
        x=requests.post(TweetURL,data=data)
        print(x.text)
        finalURL =f"{URL}&field1={temp}&field2={humi}"
        s =urllib2.urlopen(finalURL)
        s.close()
```

Output:

```
alert Temperature is above 70 c
```

Practical No: 9

Write a program to display Seven segment display 0,1,2,3

Code:

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)
GPIO.setup(5,GPIO.OUT)
GPIO.setup(6,GPIO.OUT)
GPIO.setup(12,GPIO.OUT)
GPIO.setup(13,GPIO.OUT)
GPIO.setup(16,GPIO.OUT)
GPIO.setup(4,GPIO.OUT)
GPIO.setup(17,GPIO.OUT)
GPIO.setup(18,GPIO.OUT)
GPIO.setup(27,GPIO.OUT)
GPIO.setup(22,GPIO.OUT)

import RPi.GPIO
as gpio
import time

gpio.setmode(gpio.BCM)

a = 4 b = 5 c = 6 d =7 e = 12 f = 13 g = 16

gpio.setup(a,gpio.OUT)
gpio.setup(b,gpio.OUT)
gpio.setup(c,gpio.OUT)
gpio.setup(d,gpio.OUT)
gpio.setup(e,gpio.OUT)
gpio.setup(f,gpio.OUT)
gpio.setup(g,gpio.OUT)
gpio.setup(20,gpio.OUT)
gpio.setup(21,gpio.OUT)
gpio.setup(22,gpio.OUT)

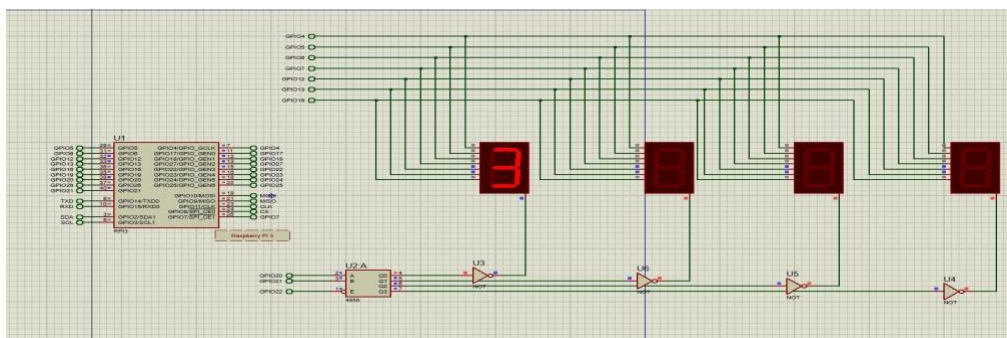
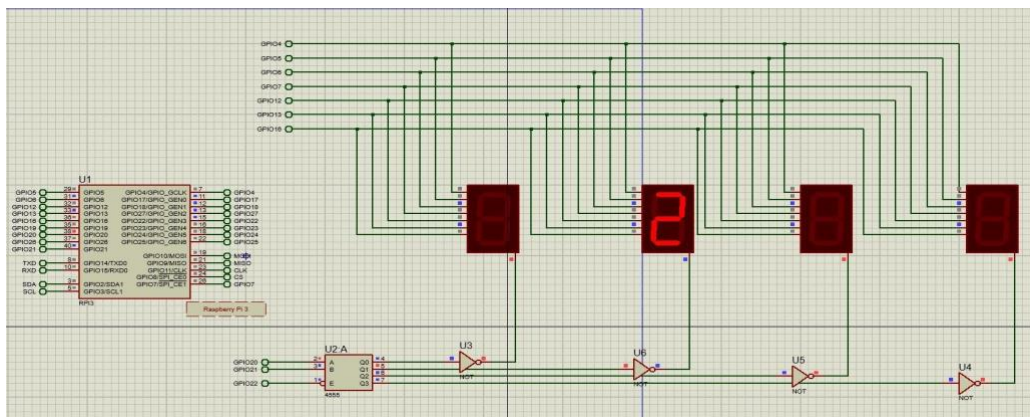
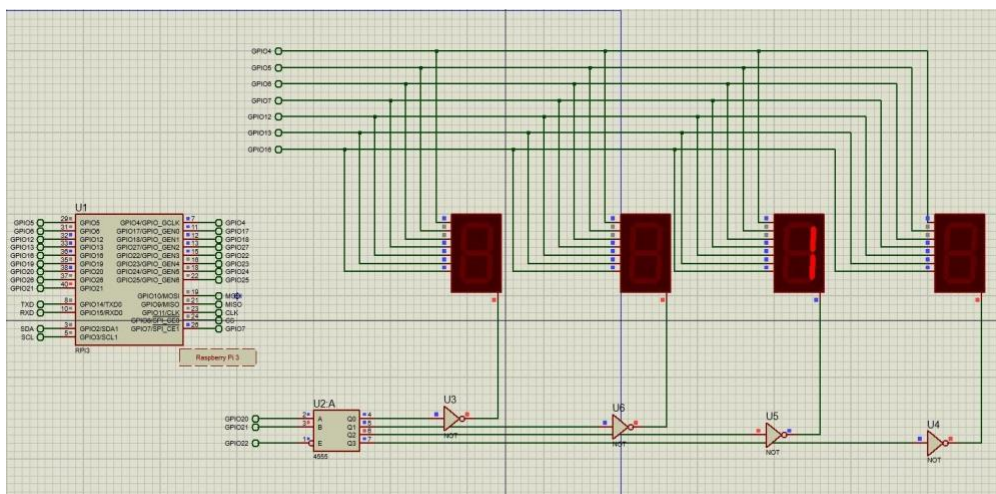
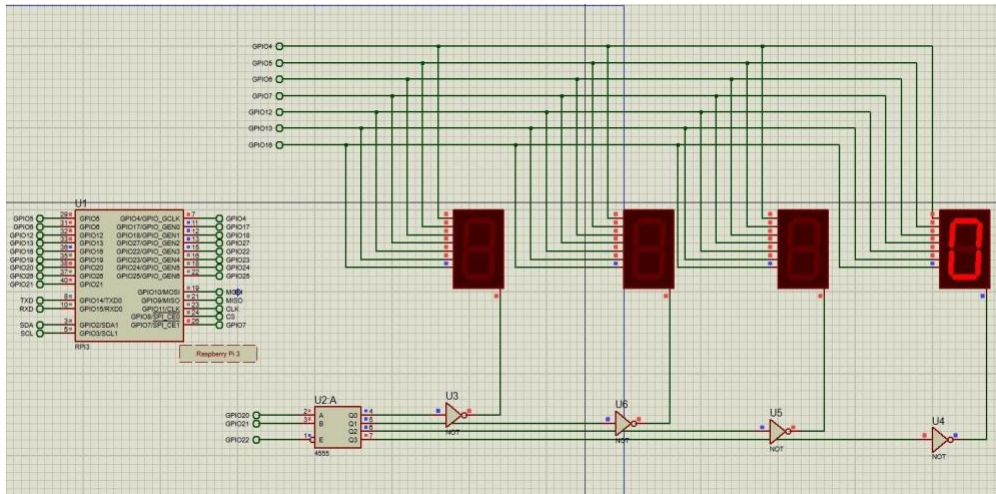
while True:

    gpio.output(a, 0)
```

```
gpio.output(b, 0)
gpio.output(c, 0)
gpio.output(d, 0)
gpio.output(e, 0)
gpio.output(f, 0)
gpio.output(g, 0)
gpio.output(22, 0)
gpio.output(20, 1)
gpio.output(21, 1)
gpio.output(a, 1)
gpio.output(b, 1)
gpio.output(c, 1)
gpio.output(d, 1)
gpio.output(e, 1)
gpio.output(f, 1)
time.sleep(1)
gpio.output(a, 0)
gpio.output(b, 0)
gpio.output(c, 0)
gpio.output(d, 0)
gpio.output(e, 0)
gpio.output(f, 0)
gpio.output(g, 0)
gpio.output(20, 0)
gpio.output(21, 1)
gpio.output(b, 1)
gpio.output(c, 1)
time.sleep(1)
gpio.output(a, 0)
gpio.output(b, 0)
gpio.output(c, 0)
```

```
gpio.output(d, 0)
gpio.output(e, 0)
gpio.output(f, 0)
gpio.output(g, 0)
gpio.output(20, 1)
gpio.output(21, 0)
gpio.output(a, 1)
gpio.output(b, 1)
gpio.output(d, 1)
gpio.output(e, 1)
gpio.output(g, 1)
time.sleep(1)
gpio.output(a, 0)
gpio.output(b, 0)
gpio.output(c, 0)
gpio.output(d, 0)
gpio.output(e, 0)
gpio.output(f, 0)
gpio.output(g, 0)
gpio.output(20, 0)
gpio.output(21, 0)
gpio.output(a, 1)
gpio.output(b, 1)
gpio.output(c, 1)
gpio.output(d, 1)
gpio.output(g, 1)
time.sleep(1)
```

Output:



Practical No:10

Write a program to move Stepper motor clockwise and anti-clockwise.

Code:

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

GPIO.cleanup()

DisplayPins=[4,5,20,21]

seq1=[1,0,1,0]
seq2=[1,0,0,1]
seq3=[0,1,0,1]
seq4=[0,1,1,0]

for pin in DisplayPins:
    GPIO.setup(pin,GPIO.OUT)
    GPIO.output(pin,0)

for i in range(0,4):
    x=DisplayPins[i]
    y=seq1[i]
    GPIO.output(x,y)
    time.sleep(1)

for i in range(0,4):
    x=DisplayPins[i]
    y=seq2[i]
    GPIO.output(x,y)
    time.sleep(1)

for i in range(0,4):
    x=DisplayPins[i]
    y=seq3[i]
    GPIO.output(x,y)
    time.sleep(1)

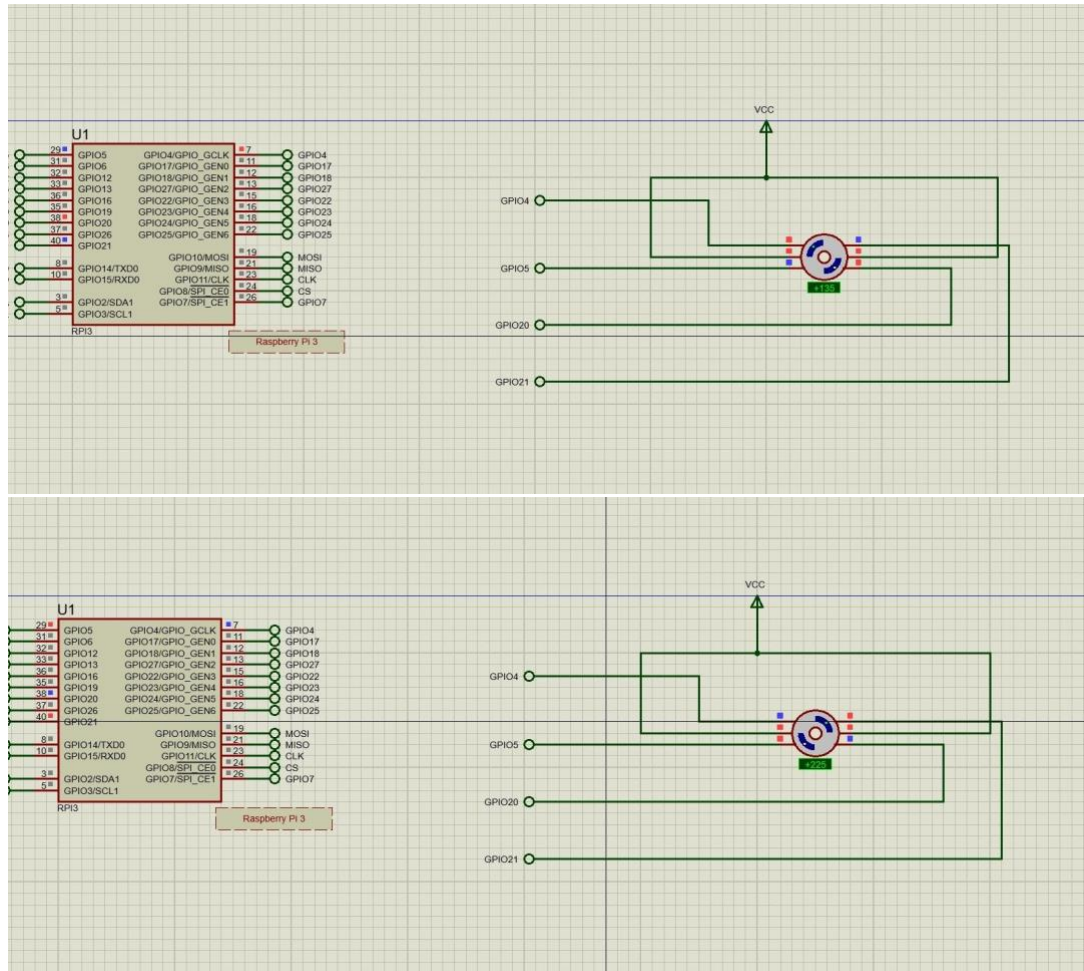
for i in range(0,4):
    x=DisplayPins[i]
```

y=seq4[i]

GPIO.output(x,y)

time.sleep(1)

Output:



Practical No: 11

Write a program to rotate DC motor

Code:

```
import RPi.GPIO as x import time

x.setmode(x.BCM)

x.setup(4,x.OUT)

x.setup(5,x.OUT)

while True:

    x.output(4,1)

    x.output( 5, 0)

    time.sleep(0.5)

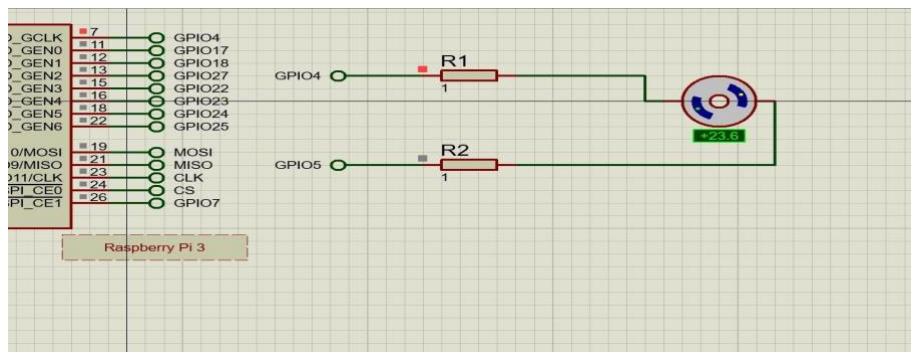
    x.output(5,1)

    x.output(4,0)

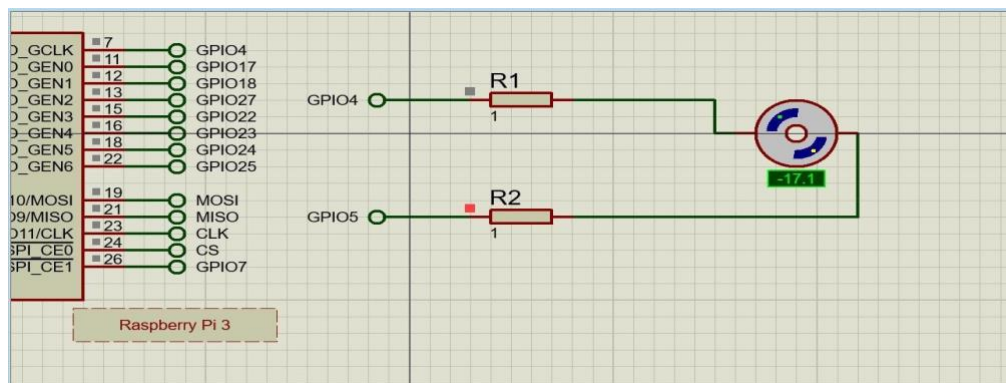
    time.sleep(0.5)
```

Output:

Motor rotating in Clockwise Direction



Motor rotating in Anti-Clockwise Direction



Practical No: 12

Write a program to display 4-bit counter using 3 LEDs connected to GPIO4,5,6,12

Code:

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)
GPIO.setup(4,GPIO.OUT)
GPIO.setup(5,GPIO.OUT)
GPIO.setup(6,GPIO.OUT)
GPIO.setup(7,GPIO.OUT)

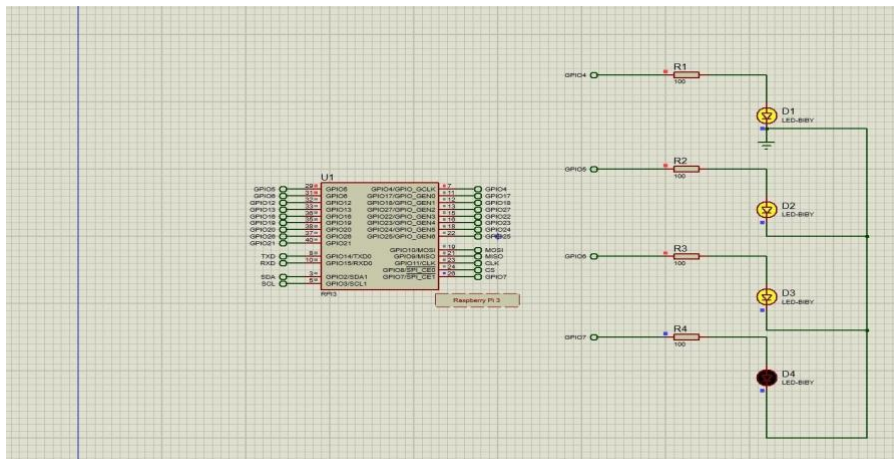
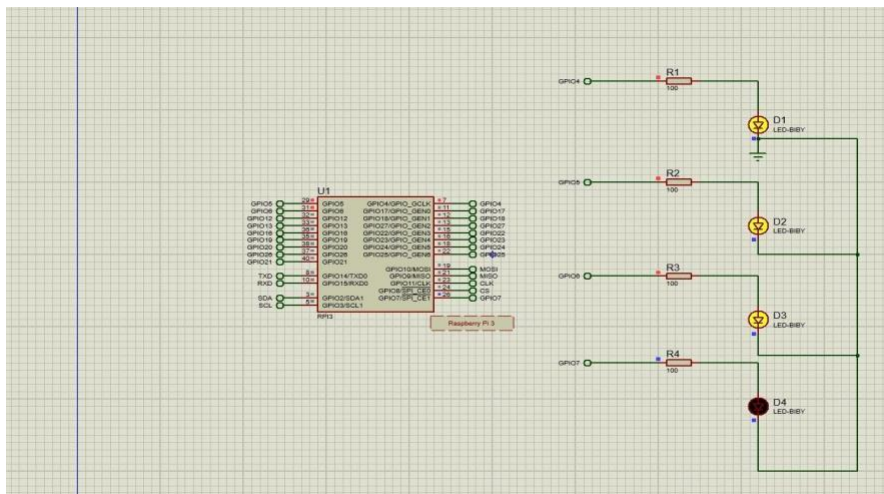
while True:
    GPIO.output(4,0)
    GPIO.output(5,0)
    GPIO.output(6,0)
    GPIO.output(7,0)
    time.sleep(1)
    GPIO.output(4,1)
    GPIO.output(5,0)
    GPIO.output(6,0)
    GPIO.output(7,0)
    time.sleep(1)
    GPIO.output(4,0)
    GPIO.output(5,1)
    GPIO.output(6,0)
    GPIO.output(7,0)
    time.sleep(1)
    GPIO.output(4,1)
    GPIO.output(5,1)
    GPIO.output(6,0)
    GPIO.output(7,0)
    time.sleep(1)
    GPIO.output(4,0)
    GPIO.output(5,0)
    GPIO.output(6,1)
    GPIO.output(7,0)
    time.sleep(1)
    GPIO.output(4,1)
    GPIO.output(5,1)
    GPIO.output(6,1)
    GPIO.output(7,0)
    time.sleep(1)
```



```

GPIO.output(4,0)
GPIO.output(5,0)
GPIO.output(6,0)
GPIO.output(7,1)
time.sleep(1)
GPIO.output(4,1)
GPIO.output(5,1)
GPIO.output(6,1)
GPIO.output(7,1)
time.sleep(1)
    
```

Output:



Practical No: 13

Write a program to display 4 bit shift register using 4 LEDs connected to GPIO4,5,6,7

Code:

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BCM)

GPIO.setup(4,GPIO.OUT)
GPIO.setup(5,GPIO.OUT)
GPIO.setup(6,GPIO.OUT)
GPIO.setup(7,GPIO.OUT)

while True:

    GPIO.output(4,0)
    GPIO.output(5,0)
    GPIO.output(6,0)
    GPIO.output(7,0)
    time.sleep(1)

    GPIO.output(4,1)
    GPIO.output(5,0)
    GPIO.output(6,0)
    GPIO.output(7,0)
    time.sleep(1)

    GPIO.output(4,0)
    GPIO.output(5,1)
    GPIO.output(6,0)
    GPIO.output(7,0)
    time.sleep(1)

    GPIO.output(4,0)
    GPIO.output(5,0)
    GPIO.output(6,1)
    GPIO.output(7,0)
    time.sleep(1)

    GPIO.output(4,0)
```

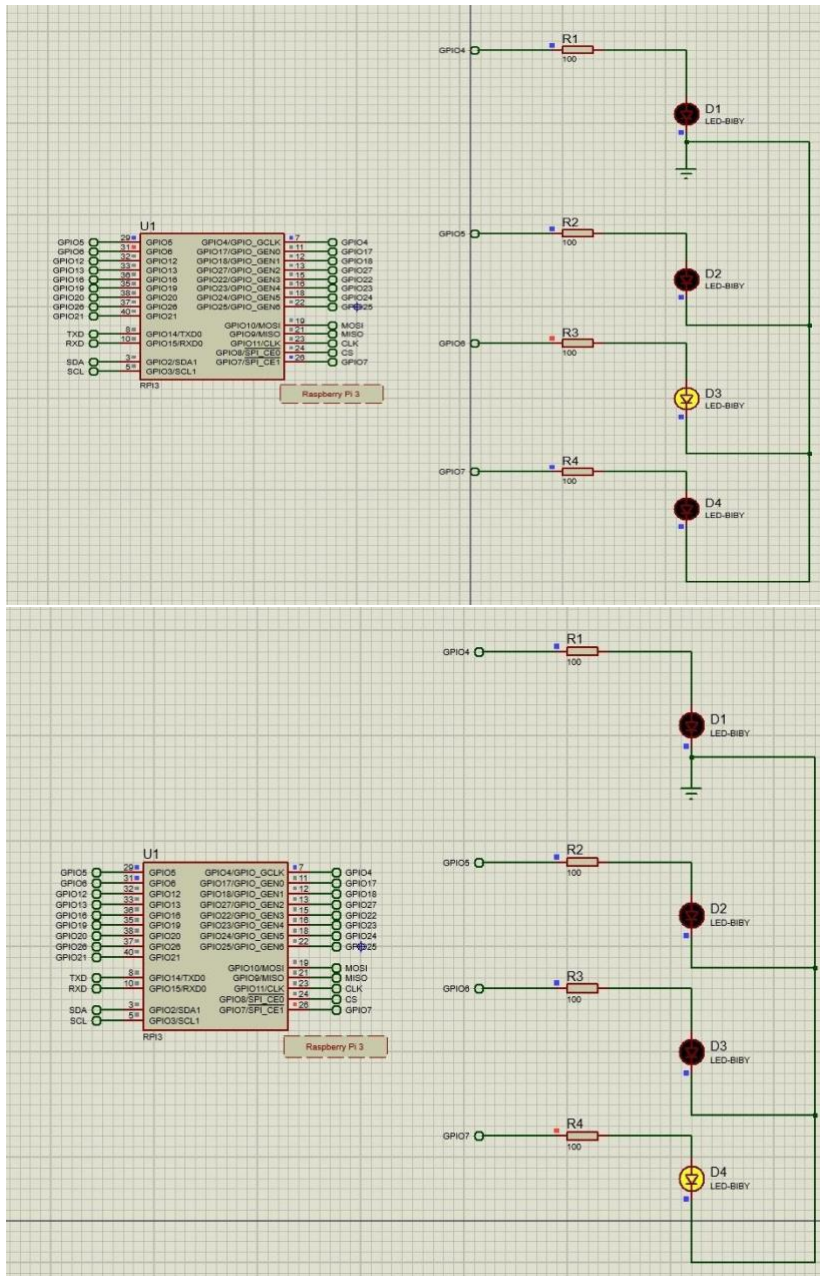
GPIO.output(5,0)

GPIO.output(6,0)

GPIO.output(7,1)

time.sleep(1)

Output:



Practical No:14

Write a program to change intensity of LED using Pulse Width modulation

Code:

```
import RPi.GPIO as GPIO

import time

led_pin=20

GPIO.setmode(GPIO.BCM)

GPIO.setup(20,GPIO.OUT)

pwm_led=GPIO.PWM(led_pin,500)

pwm_led.start(100)

while True:

    duty_s=100

    duty=int(duty_s)

    pwm_led.ChangeDutyCycle(duty)

    time.sleep(1)
```

Output:

