Practical 11 Raspberry Pi (Proteus)

Q. Write simple python programs on Pi like

a) Light an LED through Python program

b) Get input from two switches and switch on corresponding LEDs

c) Flash an LED at a given on time and off time cycle, where the two times are taken from a file

a) Light an LED through a Python program

STEP 1: Launch Proteus and create a new project
STEP 2: Write this code in main.py

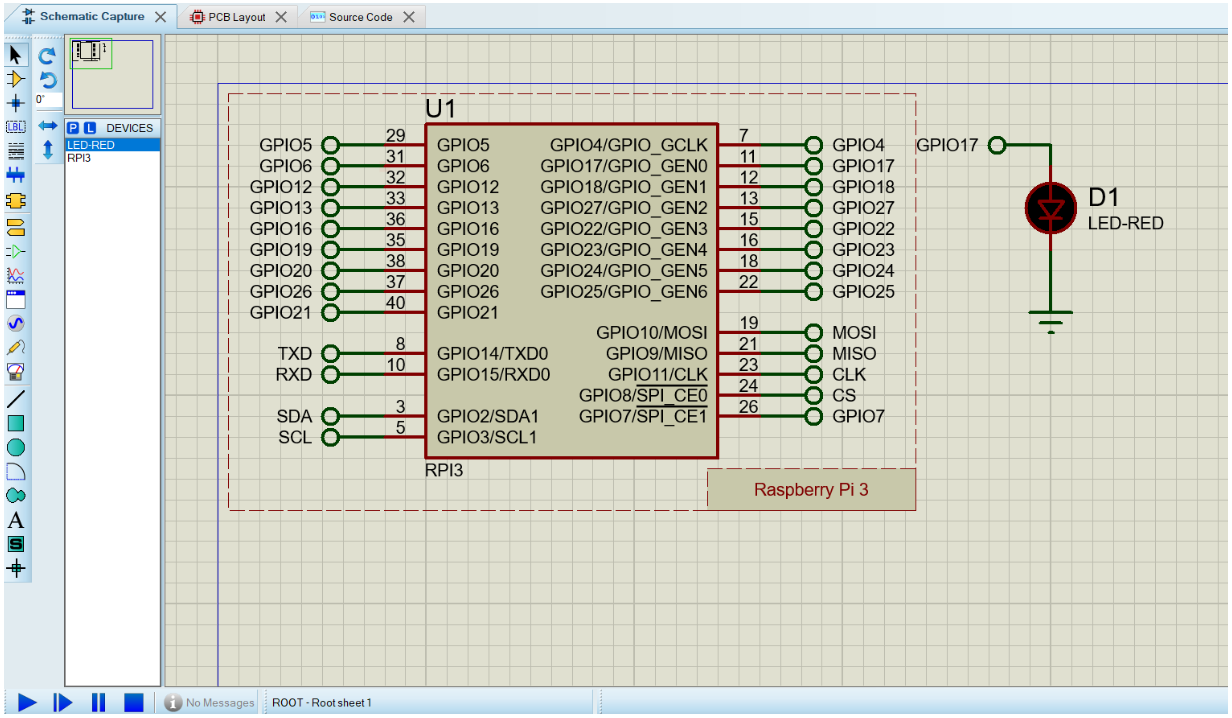
```
import RPi.GPIO as GPIO

import time

# Set up GPIO mode

GPIO.setmode(GPIO.BCM) # Use BCM numbering

GPIO.setwarnings(False)

# Define the pin for the LED

led_pin = 17 # Example GPIO pin

number # Set up the LED pin as output

GPIO.setup(led_pin, GPIO.OUT)

# Turn on the LED

GPIO.output(led_pin,

GPIO.HIGH) # Keep the LED

on for 5 seconds time.sleep(5)
```

Components Needed in the schematic capture:

1. **Raspberry Pi** model (e.g., Raspberry Pi 3B or 4B).
2. **LED**.
3. **Wires** for connections.

STEP 3: Search for LED in the library.
STEP 4: Connect the default terminal to one end of the LED
STEP 5: Connect ground terminal to other end
STEP 6: Double click on the default terminal and select GPIO 17

CONNECTIONS:



b) Get input from two switches and switch on corresponding LEDs

STEP 1: Write this code in main.py

```
import RPi.GPIO as GPIO
import time

# Set up GPIO mode
GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)
```

```
# Define the pins for switches and LEDs
switch1_pin = 4  # GPIO pin for switch 1
switch2_pin = 17  # GPIO pin for switch 2
led1_pin = 18     # GPIO pin for LED 1
led2_pin = 27     # GPIO pin for LED 2

# Set up pins
GPIO.setup(switch1_pin, GPIO.IN, pull_up_down=GPIO.PUD_UP)
# Set switch pins as input
GPIO.setup(switch2_pin, GPIO.IN, pull_up_down=GPIO.PUD_UP)
# Set switch pins as input
GPIO.setup(led1_pin, GPIO.OUT)  # Set LED pins as output
GPIO.setup(led2_pin, GPIO.OUT)

while True:
    button_state1 = GPIO.input(switch1_pin)  # Read switch 1 state
    button_state2 = GPIO.input(switch2_pin)  # Read switch 2 state
    # Read switches
    if button_state1 == GPIO.HIGH:
        GPIO.output(led1_pin, GPIO.HIGH)  # Turn on LED1
    else:
        GPIO.output(led1_pin, GPIO.LOW)   # Turn off LED1
    if button_state2 == GPIO.HIGH:
        GPIO.output(led2_pin, GPIO.HIGH)  # Turn on LED2
    else:
        GPIO.output(led2_pin, GPIO.LOW)   # Turn off LED2
    time.sleep(3)
```

Components Needed in Proteus:

1. **Raspberry Pi** (e.g., Raspberry Pi 3B or 4B).
2. **Two Push-Button Switches**.
3. **Two LEDs**.

STEP 2: Search for LED in the library.

STEP 3: Connect the default terminal to one end of the LED and ground terminal to the other end

STEP 4: Double click on the default terminal and select GPIO 18

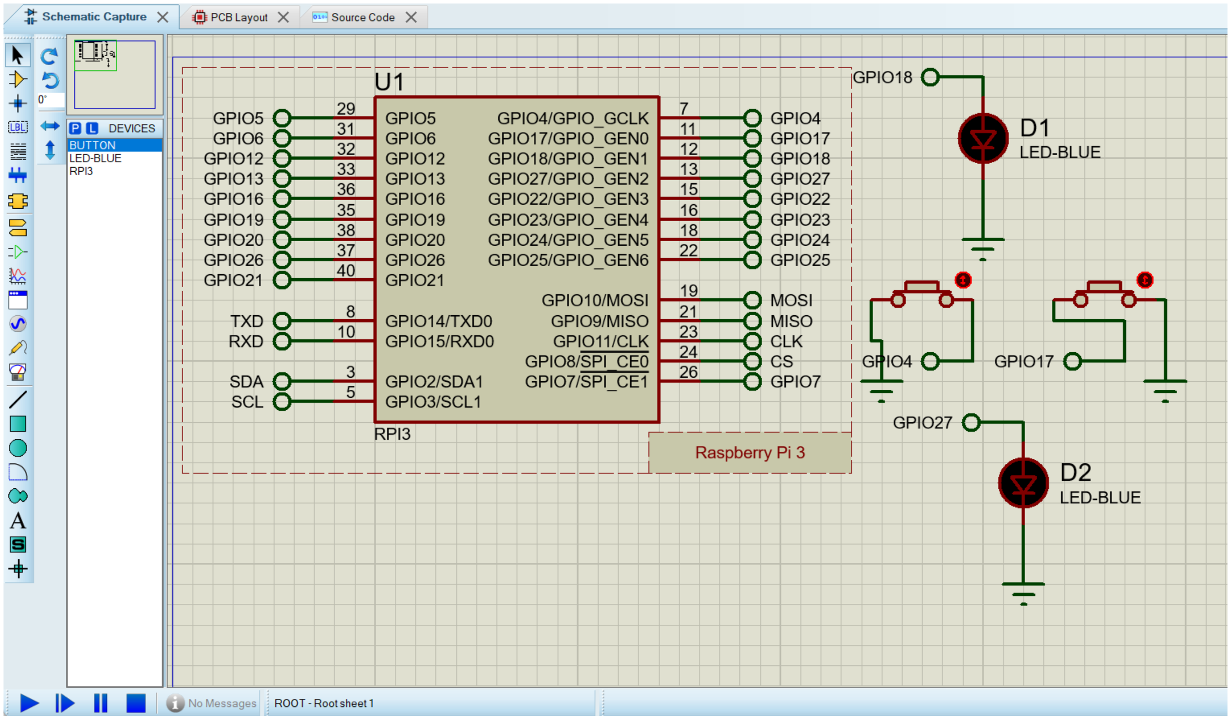
STEP 5:Follow the same steps for LED 2 but select GPIO 27.

STEP 6: Search for Button in the library

STEP 7: Connect default terminal to one end and Ground to the other end

STEP 8: Double click on the default terminal and select GPIO 4
STEP 9: Follow the same steps for second button but select GPIO 17

CONNECTIONS:



c) Flash an LED at a given on-time and off-time cycle, where the times are taken from a file

Step 1: Write this code in main.py

```
import RPi.GPIO as GPIO
import time

# Set up GPIO mode
GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)

# Define the pin for the LED
led_pin = 4  # Example GPIO pin number

# Set up the LED pin as output
GPIO.setup(led_pin, GPIO.OUT)

# Read on-time and off-time from a file
with open('file.txt', 'r') as f:
    on_time = float(f.readline().strip())  # Read and convert on-time to float
    off_time = float(f.readline().strip())  # Read and convert off-time to float
```

```
while True:
    GPIO.output(led_pin, GPIO.HIGH)  # Turn on the LED
    print(f"LED ON for {on_time} seconds")
    time.sleep(on_time)  # Keep it on for the on-time duration
    GPIO.output(led_pin, GPIO.LOW)  # Turn off the LED
    print(f"LED OFF for {off_time} seconds")
    time.sleep(off_time)  # Keep it off for the off-time duration
```

Step 2: Create a new file file.txt and add the following in the file.

1.0 #will stay on till 1.0

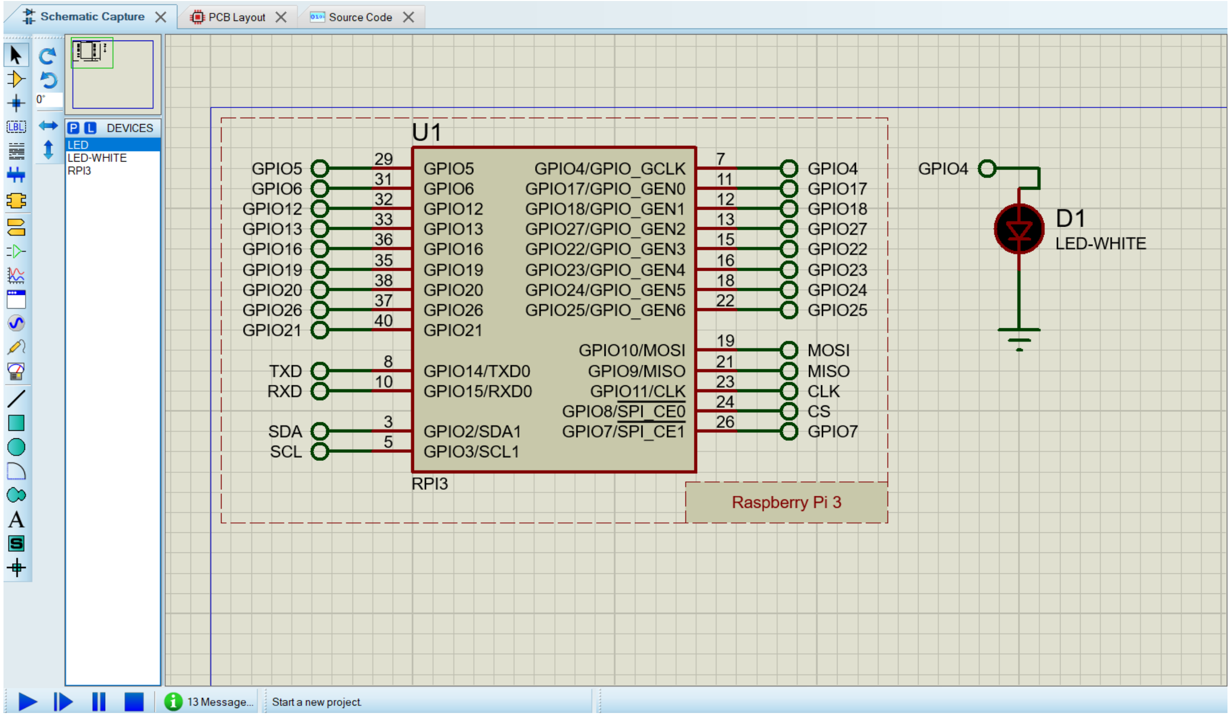
0.5 #will stay off till 0.5

Step 3: Search for LED in the library.

STEP 4: Connect the default terminal to one end of the LED and ground terminal to the other end

STEP 5: Double click on the default terminal and select GPIO 04

CONNECTIONS:



Start a new project.

Notes:

1. Ensure that the `RPi.GPIO` library is installed on your Raspberry Pi. If not, install it using: sudo apt-get install python3-rpi.gpio

2. Make sure the GPIO pins are correctly wired with the LEDs and switches.

3. The programs use BCM pin numbering; adjust the pin numbers as needed based on your Raspberry Pi model and wiring.

4. Handle GPIO pins carefully to avoid damage to the Raspberry Pi.