



AMERICAN INTERNATIONAL UNIVERSITY – BANGLADESH (AIUB)

Faculty of Engineering

Department of Electrical and Electronic Engineering

Course/Lab Name: EEE4103 Microprocessor and Embedded Systems

Semester: Spring 2023-24

Term: Final

Quiz: Lab

Total Marks: 20

Time: 30 Minutes

Question Mapping with Course Outcomes:

Item	COs	POIs	K	P	A	Marks	Obtained Marks
Q1-5	CO5	P.a.4.C.3	K4			3+5+4+4+4	
Total:						20	

Student Information:

Student Name:											Section:	B
Student ID #:											Date: 24.04.2024	Department:

1. Compute the pressure at the altitude of $(20 + a + c + e)$ m of a city. The average sea-level atmospheric pressure [3] is 101.3 kPa.
2. Determine the output of the following program. Assume that appropriate devices are connected to the ports, [5] switchpin is connected to the LOW signal. Compute the input analog voltage when the PWM value is 255.

```
int switchpin = 2;
int in1 = 5;
int in2 = 4;
int ConA = 10;
int speed1;

void setup() {
  pinMode(switchpin, INPUT);
  pinMode(in1, OUTPUT);
  pinMode(in2, OUTPUT);
  pinMode(ConA, OUTPUT); }

void TurnMotorA1() {
  digitalWrite(in1, LOW);
  digitalWrite(in2, HIGH);
  float analogvalue = analogRead(A0);
  int PWMvalue = map(analogvalue, 0, 1023, 0, 255);
  analogWrite(ConA, PWMvalue);
  Serial.println("The motor is running in the clockwise direction.");
  Serial.print("Digital Value = ");
  Serial.print(PWMvalue);
  float analogVoltage = (PWMvalue * 5.00) / 1023.00;
  Serial.print(" Analog Voltage = ");
  Serial.println(analogVoltage); }

void TurnMotorA2() {
  digitalWrite(in1, HIGH);
  digitalWrite(in2, LOW);
  float analogvalue = analogRead(A0);
  int PWMvalue = map(analogvalue, 0, 1023, 0, 255);
```

```

analogWrite(ConA, PWMvalue); // To activate the DC motor
Serial.println("The motor is running in the anticlockwise direction.");
Serial.print("Digital Value = ");
Serial.print(PWMvalue);
float analogVoltage = (PWMvalue * 5.00) / 255.00;
Serial.print("  Analog Voltage = ");
Serial.println(analogVoltage);  }

void loop() {
  if (digitalRead(2) == LOW){
    TurnMotorA1(); }
  else if (digitalRead(2) == HIGH){
    TurnMotorA2(); }
  }

```

3. As per the components given below, connect the circuit as per the following program. [4]

```

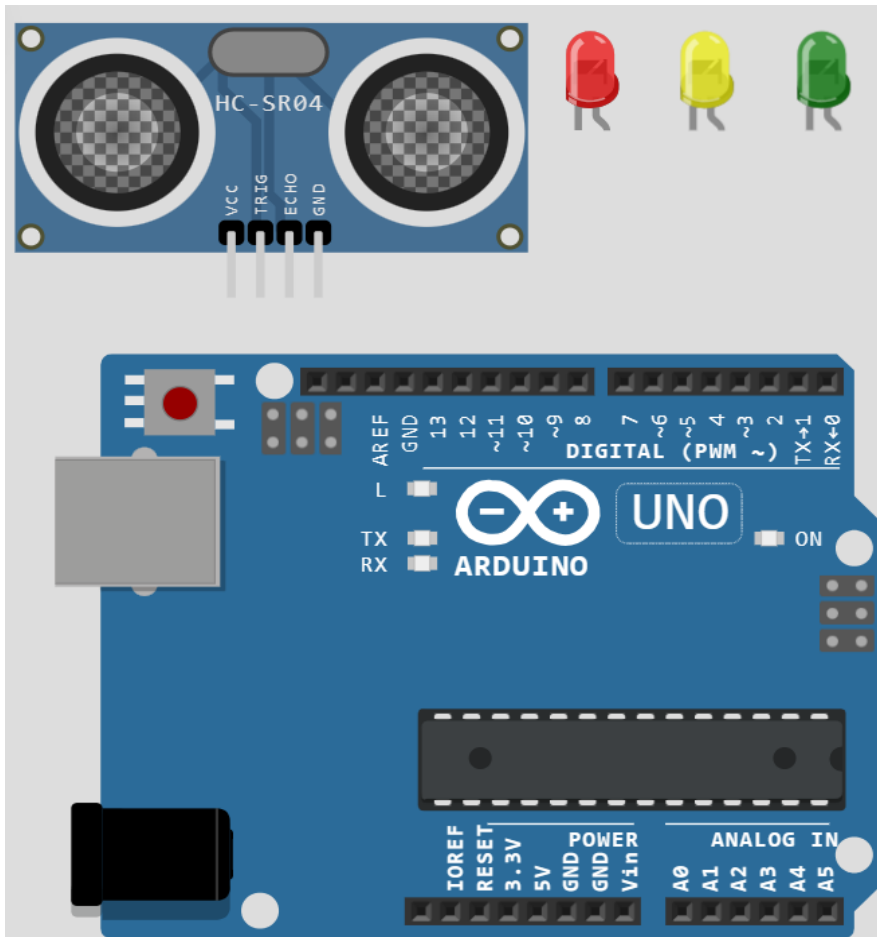
const int trigPin = 11;
const int echoPin = 10;
const int greenLED = r;
const int yellowLED = r+1;
const int redLED = r+2;

```

```

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(greenLED, OUTPUT);
  pinMode(yellowLED, OUTPUT);
  pinMode(redLED, OUTPUT);
}

```



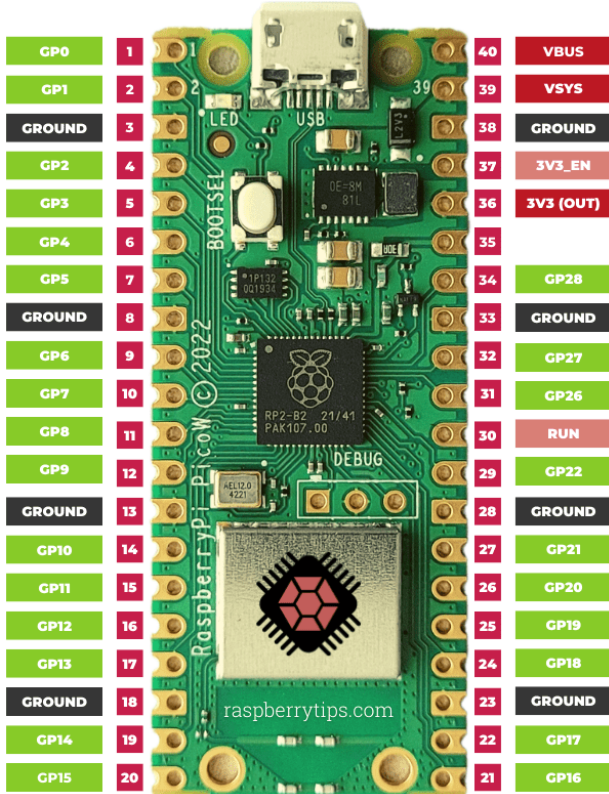
4. Determine the output of the following program at the terminal.

[4]

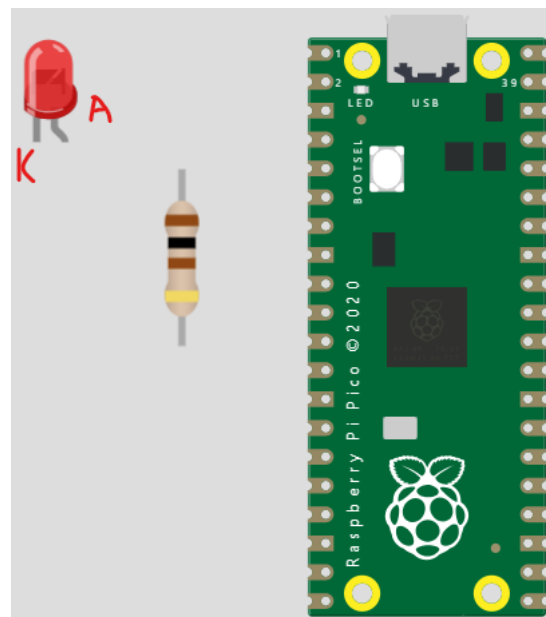
```
from machine import Pin
import time

led = Pin(p+r, Pin.OUT)
while True:
    led.on()
    time.sleep(d)
    led.off()
    time.sleep(a)
```

As per the pin configuration given below, connect the circuit as per the diagram for the above program:



Pin Diagram for Questions # 4 and 5



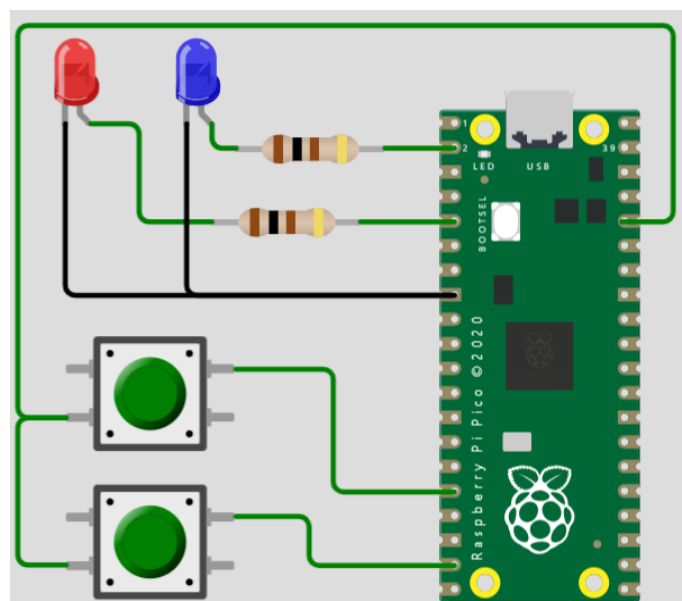
Components diagram for Question # 4

5. Determine the output of the following program based on the circuit diagram given above and the program [4] given below.

```
from machine import Pin
import time

button1 = Pin(12, Pin.IN,
Pin.PULL_DOWN)
led1 = Pin(q, Pin.OUT)
button2 = Pin(q+1, Pin.IN,
Pin.PULL_DOWN)
led2 = Pin(q+2, Pin.OUT)

while True:
    if button1.value():
        led1.toggle()
        time.sleep(b)
    if button2.value():
        led2.toggle()
        time.sleep(c)
```



Circuit Diagram for Question # 5