Department of Electrical Engineering
Mid – Term Assignment Spring 2020
Date: 20/04/2020

Course Details

Course Title: Microcontroller Systems & Interfacing

Module: 06

Instructor:

Total Marks: 30

Student Details

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Q1.	(a)	1) Ohm's Law is an equation that relates the following electrical concepts:
		  a. Voltage, current and resistance b. Resistance and reluctance
		  c. Current, power and voltage d. Voltage and current
		2) If a computer uses a 200 W power supply and it is activated for 45 minutes, how much energy has been consumed?
		  a. 540 MJ b. 5.4 kJ
		  c. None of these answers d. 540 kJ
		3) You would like to set up a circuit with 2 identical light bulbs and a battery. You hesitate between putting them in series or in parallel. The circuit that dissipates the most power is:
		  a. The same for light bulbs in series and parallel b. Light bulbs in series
		  c. Light bulbs in parallel d. Not possible to determine from the given information.
		4) For the circuit discussed in Question 3, the circuit for which the lights are the brightest is:
		  a. Light bulbs in parallel b. The same for light bulbs in series and parallel
		  c. Light bulbs in series d. Not possible to determine from the given information
		5) The circuit for which the battery will last the longest is
		  a. The same for light bulbs in series and parallel b. Light bulbs in series
		  c. Light bulbs in parallel d. Not possible to determine from the given information
			Marks 10
			CLO 1

Q2.	(a)	A parking lot must be automated using an Arduino by counting each car entering the lot and leaving the lot. The lot has a total space for 8 cars at a time. On each parking of a car a RED led must be visible to show the space has been taken. A GREEN led must be visible to show the space is vacant for a car. Write the code in C-language and draw the circuit diagram.	Marks 10 CLO 2
Q3.	(a)	A counter must be implemented using an Arduino for a room, whenever a person enters the room and presses a button the counter must the counter and display the amount on two 7 segment displays, whenever the person leaves the room and presses the second button the counter must be decremented and displayed on the 7 segment display. Write the code in C-language and draw the circuit diagram.	Marks 10 CLO 2

(50)

i) ⓐ

ii) ©

iii) ©

iv) ⓐ

v) ©

Answer to question 2:

```
Const int parkingIn = 0;
Const int parkingOut = 9;
Const int led 1 = 1;
Const int led 2 = 2;
Const int led 3 = 3;
Const int led 4 = 4;
Const int led 5 = 5;
Const int led 6 = 6;
Const int led 7 = 7;
Const int led 8 = 8;

int sensor Value, bright;
void setup() {

  Serial begin(9600);
PinMode(parkingIn, INPUT);
PinMode(parking Out, INPUT);

PinMode(led1, OUTPUT);
PinMode(led2, OUTPUT);
PinMode(led3, OUTPUT);
PinMode(led4, OUTPUT);
PinMode(led5, OUTPUT);
PinMode(led6, OUTPUT);
PinMode(led7, OUTPUT);
PinMode(led8, OUTPUT);

int availableParking = 8;
}
  void loop() {
Cat carIn = analogRead(parkingIn);
   carOut = analogRead(parking Out);
if(carIn)
{ availableParking ++;
}
}
```

```
else if (carOut)
{
  availablePacking--;
}
for(ledOn=1; ledOn<=8; ledOn++)
{
  analogWrite(led, High);
  analog Write(led, HIGH);
}
}
```

```
const int a = 8;
const int b = 9;
const int c = 4;
const int d = 5;
const int e = 6;
const int f = 2;
const int g = 3;

bool bPress = false;
const int IncbuttonPin = 10;
const int DecbuttonPin = 11;
int buttonPushCounter = 0;
int Inc button state = 0;
int last Inc button state = 0;

int Dec button state = 0;
int last Dec button state = 0;

void setup() {
  PinMode (a, OUTPUT);
  PinMode (b, OUTPUT);
  PinMode (c, OUTPUT);
  PinMode (d, OUTPUT);
  PinMode (e, OUTPUT);
  PinMode (f, OUTPUT);
  PinMode (g, OUTPUT);

  PinMode (IncbuttonPin, INPUT_PULLUP);
  PinMode (DecbuttonPin, INPUT_PULLUP);
  Serial.begin (9600);
  display Digit (buttonPushCounter);

}

void loop() {
  Incbutton state = digitalRead (IncbuttonPin);
  Decbutton state = digitalRead (DecbuttonPin);

  check IncButtonPress ();
  check DecButtonPress ();
```

```
if (bPress) {
    bPress = false;
    turnOff ();
    displayDigit (buttonPush counter);
}

for (int i=0; i<10, i++)
{
    displayDigit(i);
    delay (1000);
    turnoff;
}
void check IncButton Press ()
{
    if (IncbuttonState != lastbutton state)
    {
    if (IncbuttonState == Low) {
        bPress = true;
        buttonPush counter++;
        if (buttonPush counter> 9) buttonPush counter = 0;
        Serial.Print In ("on");
    } else {
        Serial.print In ("off");
    }

    delay (50);
    }
    last IncbuttonState = IncbuttonState;
}
void chck Der Button Press ()
{   if (DerbuttonState != last Derbutton State) {
    if (DerbuttonState == Low) {
        bPress = true;
        buttonPush counter--;
```

```
if (button Flush Counter ==0) buttonPushCounter = 9;
  }
  Serial.print ln ("On");
  }
  else {
   Serial print ln ("Off");
  }
   delay (50);
  }
   last Dec button State = DecbuttonState;
  }
  void display Digit (int digit)
  {
   if (digit !=1 && digit !=4)
   digital write (a, High);———HIGH
    if (digit !=5 && digit !=6)
    digital write (b, High);— HIGH
    if (digit !=2)
     digital write (c, HIGH);
    if (digit !=1 && digit !=4 && digit !=7)
      digital Write (d, HIGH)
    if (digit ==2 || digit ==6 || digit ==8 || digit ==0)
    digitalWrite (e, HIGH);
    if (digit !=1 && digit !=2 && digit !=3 && digit !=7)
    digital write (f, HIGH);
    if (digit !=0 && digit !=1 && digit !=7)
     digital Write (g, HIGH);
  }
  void turnOff()
  {
   digital Write (a, LOW);
   digital Write (b, LOW);
   digital Write (c, Low);
   digital write (d, Low);
```

Digital Write (e, Low);
Digital Write (f, Low);
Digital Write (g, Low);