Course Code: __EEE413__ **Course Title:** Microcontroller & Embedded Systems **Prerequisite:** Programming Fundamentals, Digital Logic Design **Instructor:** Engr. Muhammad Waqas **Module: 6** **Program:** BEE **Total Marks:** 30 **Time Allowed:** 4 Hours

Note: Attempt all questions.   <mark>**Name: FAWAD AHMAD (13204)**</mark>

Q1.	(a)	**Write** short notes on the following with examples
		   a) What is pull-up resistor? How do we use pull-up resistor with 8051 microcontroller? Draw the circuit diagram.
		   b) What is pull-down resistor? How do we use pull-down resistor with 8051 microcontroller? Draw the circuit diagram.
		   c) How many hardware timers are present in 8052?
		   d) How many Input / Output ports are in an 89c51 microcontroller?
		   e) What is the difference between a microcontroller and a microprocessor?
			Marks 5
			CLO 1

	(b)	**Convert** the following to their respective bases
		   a) $89501_{10} = ?_8$
		   b) $64101_{10} = ?_2$
		   c) $9AB3_{16} = ?_2$
		   d) $1110100100111_2 = ?_8$
		   e) $1011000011011_2 = ?_{16}$
			Marks 5
			CLO 1

Q2	(a)	**Code** the following scenario You are asked to make an anti-burglar system using 8051 microcontroller. There must be a hidden switch on the ground which will be connected to the controller. When the switch is in OPEN state the microcontroller should have the GREEN led in the ON state and the RED led in the OFF state. When the switch is in the CLOSED state the microcontroller should have the RED led in the ON state and the GREEN led in the OFF state. Write the code in C-language and draw the circuit diagram.	Marks 7 CLO 1
	(b)	**Code** the following scenario A parking lot must be automated by counting each car entering the lot and leaving the lot. The lot has a total space for 99 cars at a time. A display should be seen to the parking lot worker on how many cars are parked currently. On each entering of car into the lot must increment the display and on each leaving of car must decrement the display. Write the code in C-language and draw the circuit diagram.	Marks 7 CLO 1
Q3	(a)	**Identify** errors in the following code if any	Marks 6 CLO 1

```
#incl <reg50.h>
sbit led = P2^10;
void delay(unsigned int x) {
        unsigned int y,z
        for(y=0;y=<x;y++)
                for(z=0;z<=1275;z++)
}
void main();
{
        while(1) {
            Led = 0;
            Delay(-350);
            Led = 1;
                Delay(-350);
        }
}
```
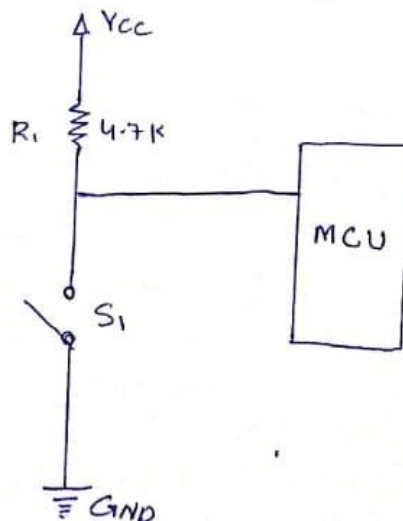
①

Q1 (A)

Ans:- ⓐ

Pull up Resistor:-

Pull up resistor are resistors which are used to ensure that a wire is pulled to a high logical level in the absence of an input Signal.

→ When the GPIO (General Purpose Input/output) Voltage level is low then it is in high or high impedance state then the pull up and pull down resistor are used to ensure GPIO which is always in a valid state.
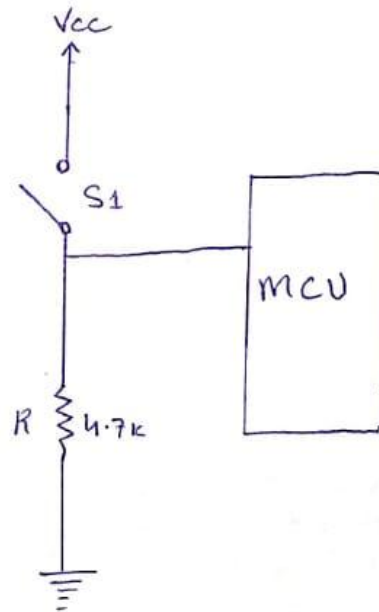
Ans :-

Pull Down Resistor:-

Pull Down Resistors work in the Same manner as Pull-up resistors. except that they Pull the pin to a logical low value. They are Connected between ground the appropriate pin on device.

Vcc

S1

MCU

$R \gtrless 4.7k$

Ans :- There are Three hardware timers are present in 8052.

The 8051 has two Timers T0 and T1. Which may be configured and used individually. The 8052 has an additional Timer T2.

— x — x — x — x — x

d

Ans :-

There are 32 input/output ports are in 89C51 microcontroller.

— x — x — x — x

Ans:-

Micro Controller:-

A micro Controller is a Small Computer on a Single integrated Circuit Containing a Processor Core memory and Programmable input/output.

④ ## microProcessor:-

MicroProcessor is an Ic Which has only the CPU inside i-e the Processor Power Such as Intel Pentium 1, 2, 3, 4 Core 2duo, i3, i4 i5 etc.

Q₁ (B)

a) $(89501)_{10} = ?_8$

Sol:-

8	89501	
8	11187	→ 5
8	1398	→ 3
8	174	→ 6
8	21	→ 6
8	2	→ 5

$(89501)_{10} = (256635)_8$

(b) $(64101)_{10} = ?_2$

2	64101	
2	32050	→ 1
2	16025	→ 0
2	8012	→ 1
2	4006	→ 0
2	2003	→ 0
2	1001	→ 1
2	500	→ 1
2	250	→ 0
2	125	→ 0

2	62	→ 1
2	31	→ 0
2	15	→ 1
2	7	→ 1
2	3	→ 1
2	1	→ 1

$(64101)_{10} = (1111101001100 \; 101)_2$

Continues ↗

© $(9AB3)_{16} = ?_2$

Sol:-

$$(9 A B 3)_{16}$$

9	A	B	3
↓	↓	↓	↓
1001	1010	1011	0011

$$(9AB3)_{16} = (1001\ 1010\ 1011\ 0011)_2$$

← →

ⓓ $(111010010011 1)_2 = ?_8$

Sol:- Let x be required Break $(1110100100111)_2$
into groups of 3 Bits.

001	110	100	100	111
↓	↓	↓	↓	↓
1	6	4	4	7

$$(1110\ 100\ 100111)_2 = (16447)_8$$

ⓔ

$$(1011\ 0000\ 11011)_2 = ?_{16}$$

Sol :-

Break into group of four so

1011	0000	1011
↓	↓	↓
B	0	B

$$(1011\ 0000\ 1011)_2 = (B0B)_{16}$$

←——————————————→

Q2 (A)

Sol:

```
#include < reg 5$.h >

    Sbit Green Led = P1^1;

    Sbit Red Led = P1^2;

    Void delay int (x);

    Sbit Switch = 0;

    int x,y;

    Void main ( )
{

    if (switch == 0)    on state
{

        Green led = 1;
        Red led = 0;
}
```

```
if else ( Switch = = 1 ) off State

    {
            Green Led = 0;
            Red   Led = 1;
    }
   else
       {
                Green Led = 0;
                Red   Led = 0;
       }
```

Micro
controller

Q2 (B)

Sal:-

```
# includ < reg 51.h >

Sbit P1 = 00;    Sbit Switch = P3 ^2;

Sbit P2 = 00;    Sbit Switch = P3 ^3;

Void delay int (x);

Void main ( )

{

int i,j;    iF Switch1 == = 1)

For ( i=0; i< 9; i++)

For ( j=0; j< 9 , j++)

{

    P1 = ++;
    P2 = ++;

}
```

```
if  else

    {

        if  Switch 2 = = 0)

    {

        For (i=0; i≤9; i--)
        For (j=0; j≤9; j--)

    {

            P1 = - - ;
            P2 = - - ;

    }
```
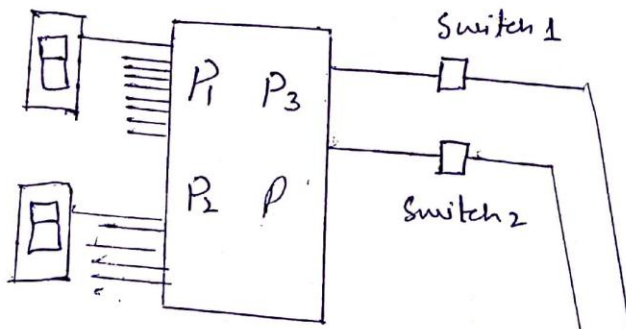
Q3 (A)

Sol:-

```c
#include < reg*51.h >

Sbit led = P2^7;

Void delay ( unsigned Char x ) $
{

unsigned j, z

for ( j=0; j= < x y; j++)

    for ( z=0; z< = 1275; z++)
}

Void main ( )
{

    while (1)
    {

        led = 0;
        Delay ( );
        led = 1;
        Delay (+350)
    }
}
```

END OF PAPER

THANKS