

Name :- Aquib Shukaib

ID :- 6978

Subject :- Microcontroller System Interfacing

Question 1 :-

a) Difference b/w Microcontroller and microprocessor.

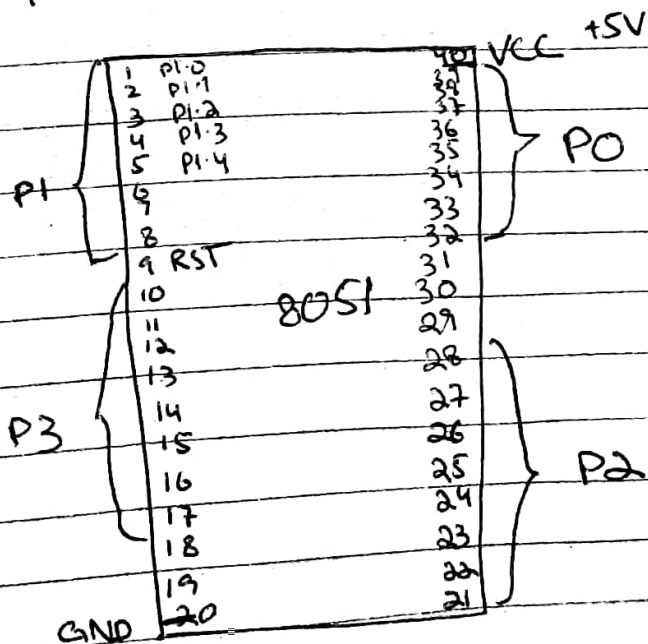
- \*1) Microprocessor consists of only a CPU whereas Microcontroller contains CPU, memory, I/O all integrated into one chip
- \*2) Microprocessor is used in Personal computer whereas Microcontroller is used in an embedded system.
- \*3) Microprocessor uses an external bus to interface RAM, ROM and other peripherals on the other hand Microcontroller uses an internal controlling bus.
- \*4) Microprocessor is complicated and expensive with large instructions to process while Microcontroller is cheap and fewer instructions to process.

b) Pin Diagram of 8051

Total 32 Pins

Four ports

P0, P1, P2, P3



(2)

c) In 8051, we have three timers.  
T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>

d) Port 0 :-

It can be used for both data and address handling while connecting as 8051 to external memory. Port 0 can provide both address and data. The 8051 then multiplexes the input as address or data in order to save pins.

Port 2 :-

Besides working as I/O, Port 2 is also used to provide 16 bit address bus for external memory. Port 2 is used for the upper 8 bit of the 16 bit address and it cannot be used for I/O and in this way any program code for external ROM is addressed.

Port 3 :-

It is also 8 bits and can be used as input/output. This port provides some extremely important external signals. P3.0 and P3.1 are RXD and TXD respectively and are collectively used for serial communication.

(3)

e) Delay of 56.384

```
#include <reg51.h>
void TI Delay ;
void main (void)
{
    while 1
    {
        P1 = 0x55;
        TI Delay(1);
        P1 = 0xAA;
        TI Delay(1);
    }
}

Void TI Delay() {
    TMOD = 0x01;
    T1 = 0x00;
    TH 1 = 0x35;
    TR0 = 1;
    while (TFO == 0);
    TRI = 0;
    TFI = 0;
}
```

$$\begin{aligned} 51968 \times 1.085 &= 56385.28 \mu s \\ &= 56.384 \text{ ms delay.} \end{aligned}$$

4

```
f) #include <reg51.h>
```

```
  sbit Led = P0^0;
```

```
  void timerDelay()
```

```
{
```

```
  TH0 = 0x4B;
```

```
  TL0 = 0xFD;
```

```
  TRO = 1;
```

```
  while (TF0 == 0);
```

```
  TF0 = 0;
```

```
  TRO = 0;
```

```
}
```

```
void main
```

```
{
```

```
  TMOD = 0x01;
```

```
  while (1)
```

```
{
```

```
  LED = 1;
```

```
  timerDelay();
```

```
  LED = 0;
```

```
  timerDelay();
```

```
}
```

```
}
```

Q2:-

Answer:-

In this User 1 will give input through button to User 2 which will increase or decrease number on User 2 display.

```
#include <reg51.h>
```

```
sbit button1 = P1^0;
```

```
sbit button2 = P1^1;
```

```
sbit out1 = P3^0;
```

```
sbit out2 = P3^1;
```

```
void main()
```

```
{
```

```
if (button1 == 0)
```

```
{
```

```
out1 = 1;
```

```
}
```

```
if (button2 == 0)
```

```
{
```

```
out2 = 1;
```

```
}
```

```
else
```

```
{
```

```
out1 = 0;
```

```
out2 = 0;
```

```
}
```

This code will be used for User 1 for the input

(6)

User 2 code:-

```
#include <reg51.h>
```

```
#define out P2
```

```
sbit in1 = P1^0;
```

```
sbit in2 = P1^1;
```

```
unsigned int num = 0x00;
```

```
int convert(void);
```

```
void delay(void);
```

```
void main()
```

```
{
```

```
    out = 0x00;
```

```
    while (1)
```

```
    {
```

```
        if (in1 == 1)
```

```
        {
```

```
            delay(1);
```

```
            num ++
```

```
            out = convert();
```

```
        }
```

```
        if (in2 == 1)
```

```
        {
```

```
            delay(1);
```

```
            num --;
```

```
            out = convert();
```

```
        }
```

```
    }
```

```
int convert()
```

```
{
```

```
    unsigned int num1 = num % 10;
```

```
    unsigned int num2 = num / 10;
```

```
    return ((num2 << 4) | num1);
```

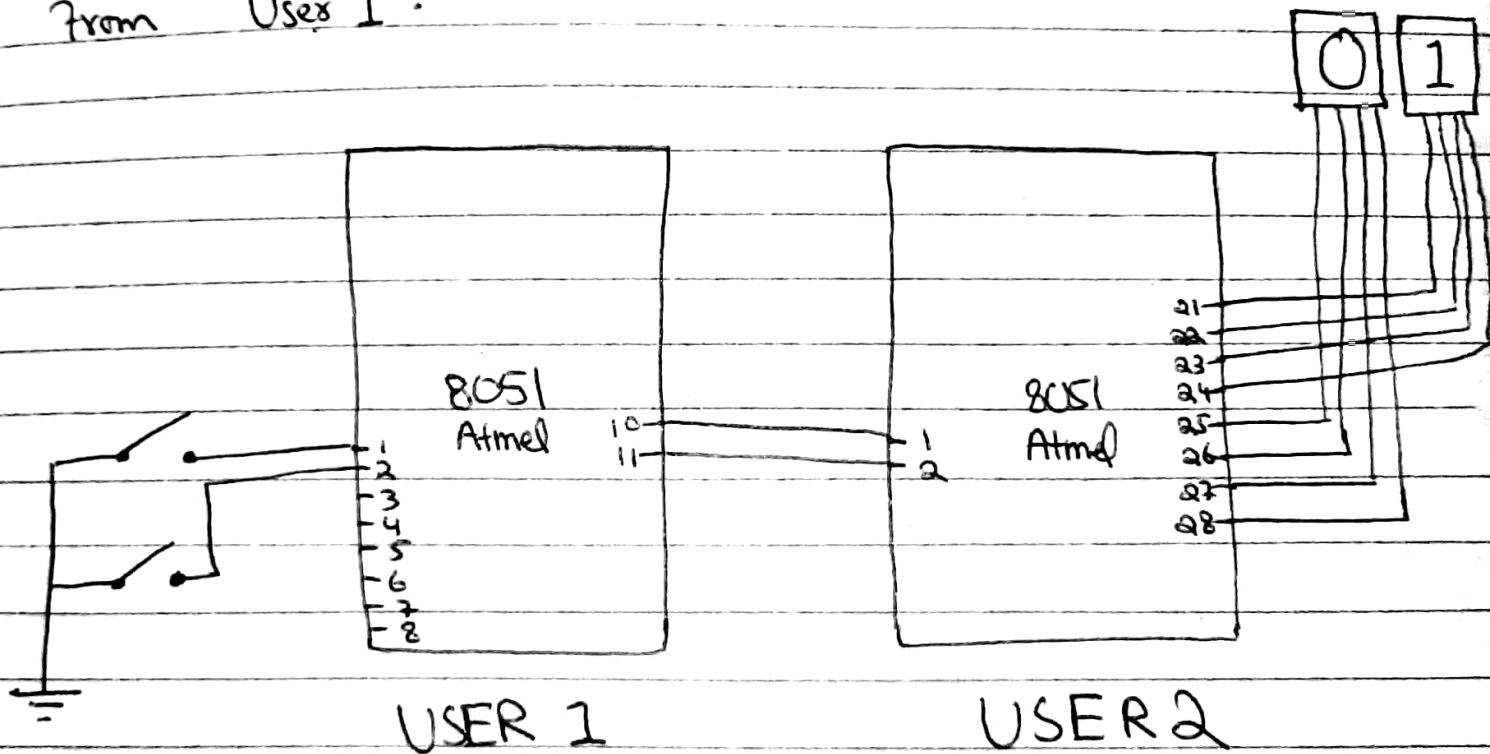
```
}
```

7

```
void delay()
```

```
{  
  unsigned int i, j;  
  for (i=0; i<100; i++)  
    for (j=0; j<500; j++);  
}
```

This code will be used by User 2 to receive the input from User 1.



Question 3:-

Code for transmitter which will transmit it to receiver

```
#include <reg51.h>
sbit m1p = P2^0;
sbit m1n = P2^1;
```

Motor 1

```
sbit m2p = P2^2;
sbit m2n = P2^3;
```

Motor 2

```
sbit F = P1^0;
sbit Ba = P1^1;
```

```
void forward()
{
  m1p = 1;
  m2p = 1;
  m1n = 0;
  m2n = 0;
}
```

```
void backward()
{
  m1p = 0;
  m2p = 0;
  m1n = 1;
  m2n = 1;
}
```

```
void stop()
{
  m1p = 0;
  m1n = 0;
}
```



9

```
m2p = 0;  
man = 0;  
}
```

Code for Receiver which will receive command from transmitter.

```
#include <reg51.h>
```

```
{  
void main()
```

```
{  
F = 0;
```

```
Ba = 0;
```

```
while (1)
```

```
{  
if (F == 1)
```

```
forward ();
```

```
else if (Ba == 1)
```

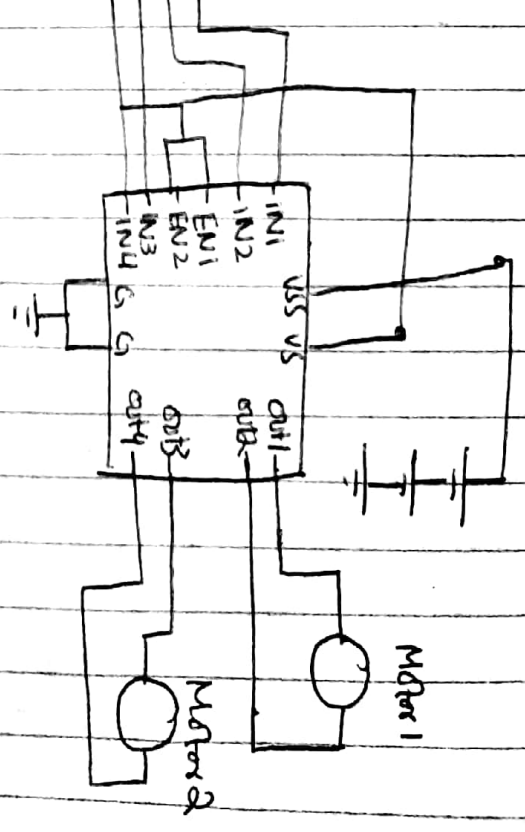
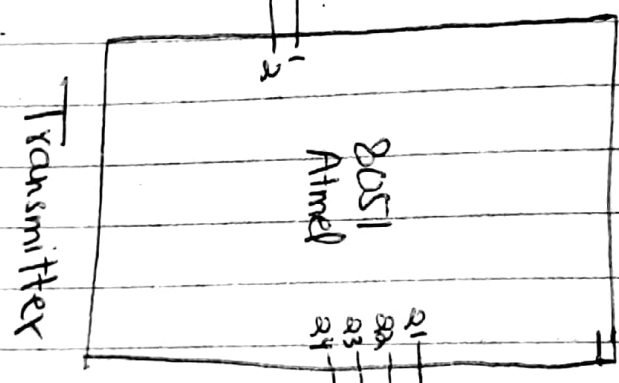
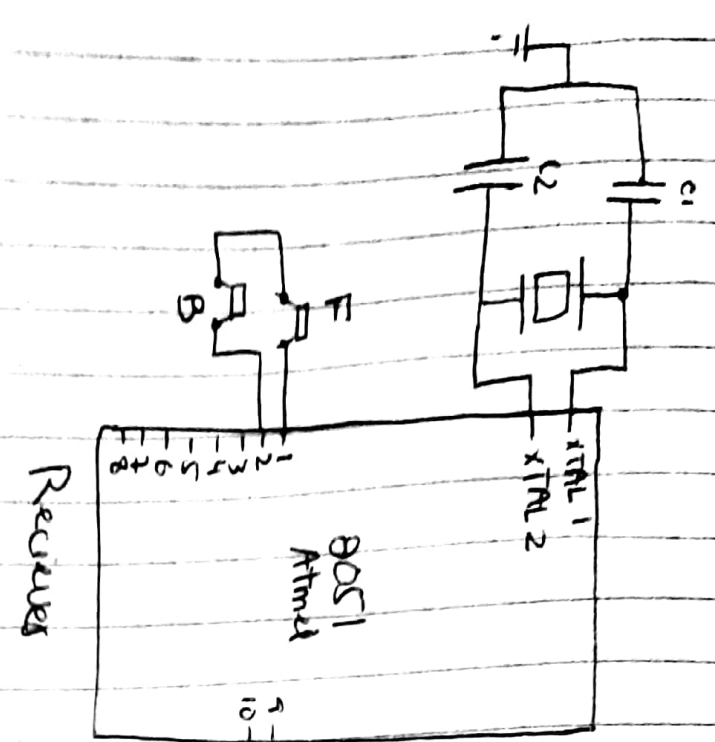
```
backward ();
```

```
else
```

```
stop ();
```

```
}
```

```
}
```



# Question 4

part (a)

Switch and the LED are connected with each other as an AND Gate. When both are "1". The LED 2 will turn off. After 100ms delay it will turn on. and if switch is on and the LED 1 is OFF. The LED 2 will turn on and after the 100 ms delay it will turn on. This process will continue until the loop ends.

part (b)

```

#include <reg50.h>
sbit SW1 = P3^1;
unsigned int i = 0;
void delay_ms (unsigned int x)
{
  unsigned int y, z;
  for (y = 0; y <= x; y++)
    for (z = 0; z <= 1275; z++);
}
void main ()
{
  while (1)
  {
    if (SW1 == 1)
      P3 = i++;
    delay_ms (100);
  }
}

```