

Iqra National University, Peshawar

Department of Electrical Engineering

Summer Final-Semeste 2020, Date: 30/09/2020

Course Code: \_\_\_\_\_  
interfacing

Course Title: Microcontroller Systems &

Prerequisite: \_\_\_\_\_

Instructor: Engr. Muhammad Waqas

Module: 8<sup>th</sup> Program: BS(EE)

Total Marks: 50

Time Allowed: 4 Hours

Note: Attempt all Questions:

**FAWAD AHMAD (13204)**

Q. NO.	Questions	Marks
1.	<p>Write short notes of 4 lines MAX or bullet points on the following with examples</p> <p>a) Explain the difference between microprocessors and micro controller</p> <p>b) Draw the pin diagram of the Intel 8051 micro controller.</p> <p>c) How many hardware timers are present in 8052?</p> <p>d) Explain the dual role of port 0, port 2, port 3.</p> <p>e) Make an accurate delay of 56.384 ms using timer 1 in mode 1.</p> <p>f) Make an accurate delay of 50 ms using timer 1 in mode 1.</p>	<p>2</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p> <p>2</p>
2.	<p>You are asked to make a standalone communication link using two 8051 microcontrollers. One 8051 microcontroller will be with User1 while the other with User2. User1 will enter numbers which will be transmitted to User2 and will be displayed on User2's LCD Screen, and vice-versa on User1. Data should be sent and received through Serial Communication ONLY. Write the code in C-language and draw the circuit diagram.</p>	7+5

3.		<p>You are asked to make a small Remote Controlled Car using two 8051 microcontrollers. One will be your transmitter and the other receiver. Transmitter will send command for Forward and Reverse using two pushbuttons on the transmitter side using serial communication. Receiver will examine the data received and act accordingly using two brushless DC-Motors operating at 24V. Write the code in C-language and draw the circuit diagram.</p>	7+5
4.	a)	<p>What will the following code do?</p> <pre> #include &lt;reg51.h&gt; sbit sw1 = P0^0; sbit led1 = P0^1; sbit led2 = P0^2; unsigned int i = 0; void delay (unsigned char x) {     unsigned int i,j;     for(i=0;i&lt;=x;i++)         for(j=0;j&lt;=1275;j++); } void main() {     while(1)     {         if(sw1 == 1 &amp;&amp; led1 == 1)         {             led2 = 0;             delay(100);             led2 = 1;         }         if(sw1 == 1 &amp;&amp; led1 == 0)         {             led2 = 1;             delay(100);             led2 = 0;         }     } } </pre> <p>Find errors in the following code if any.</p>	7

```
#includ <reg50.h>
sbit SW1 = P3^1;
void delay(unsigned int x)
{
    unsigned int y,z;
    for(y=0;y<=x;y--)
        for(z=0;z<=1275;z++)
}
void main(1)
{
    while(0)
    {
        If(SW1 == 1)
            P2 = i++;
            Delay_ms(1000);
    }
}
```

b)

7

Que # 01 (a)

Microprocessor  
~~Micro Controller~~

1) Micro <sup>Processor</sup> ~~Controller~~ is a complete functional CPU i.e. it contains ALU registers, stack pointer, Program Counter, instruction decode and control unit and Interrupt processing circuit.

② Microprocessor Based Product are primarily designed to interact with humans and are more flexible to design.

③ Access Times for external memory and I/O device are more resulting in a slower system.

~~Micro Processor~~  
Micro Controller

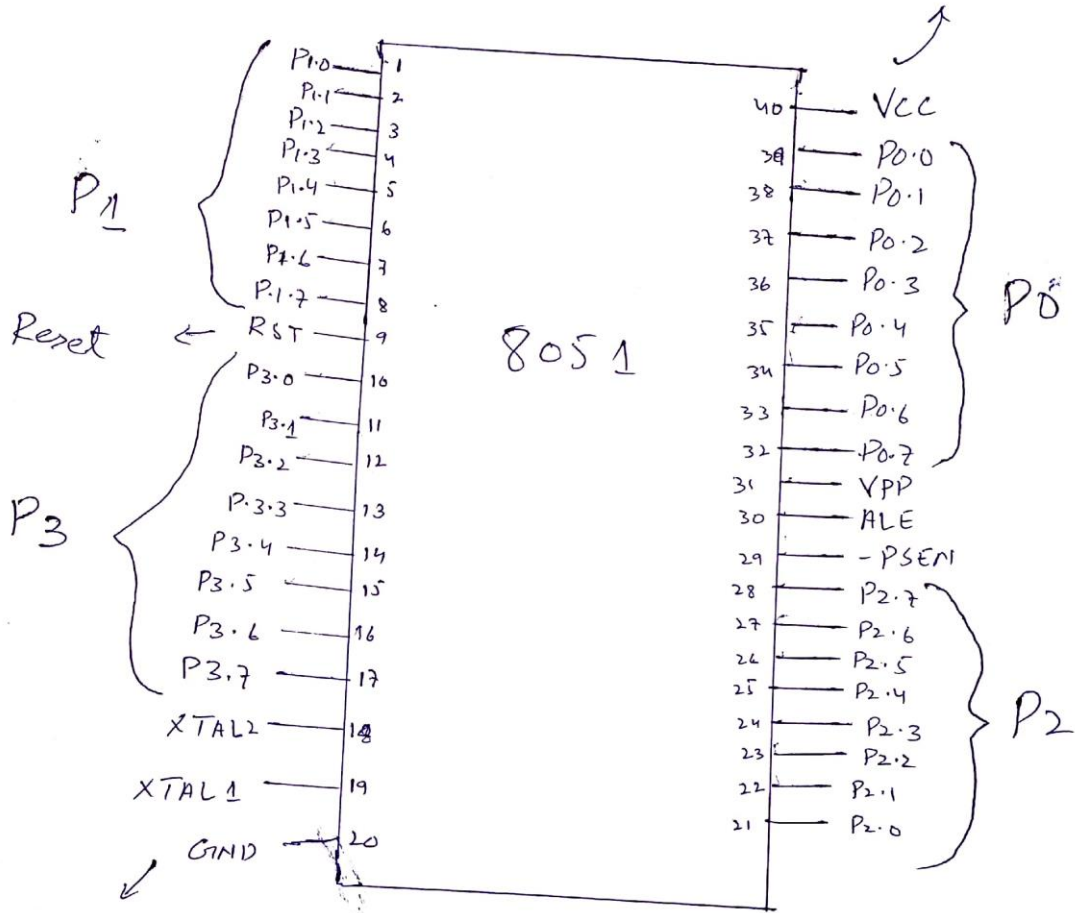
Microcontroller is a complete functional micro computer i.e. it contains the circuitry of microprocessor and in addition it has built in memory (ROM, RAM) I/O circuits and peripheral necessary for an application.

② microcontroller Based Product are primarily designed to interact with machines once a system is designed they are less flexible.

③ Access Time for on-chip memory and I/O devices are less resulting in faster system.

Q1 (B)

provide +5V supply



Ground

The Pin Diagram of 8051 microcontroller consist of 40 pins as shown. A total 32 pins are set away into four ports such P0, P1, P2, P3 where each port contain 8 pins.

Que # 01 (c)

3

Answer :-

The pin configuration of 8052 is exactly similar to that 8051 except that the first two points P1.0 and P1.1 are multiplexed to correspond to Timer 2 operation as given in following Table.

Existing	Alternate	Function.	input
P1.0	T <sub>2</sub>	Timer 2 External Count	
P1.1	T <sub>2</sub> Ex	Timer 2 Trigger input.	

So 8052 also has Timer 2.

Part D)

Answer :-

Dual Role of Port 0 :- Port 0 can be used to configure for both data and address. The Port 0 is also designated as AD0-AD7. When connecting an 8051 to external memory Port 0 provide both address and Data.

The dual Role of Port 2 :-

Port 2 has a dual Role. Port 2 is also designated as A8-A15. This indicates that Port 2 has a dual function. Port 2 provide bit A8-A15 of the address. When 8031 is connected to external memory Port 2 is used for the upper 8 bits of the 16 bits address and it cannot be used for input/output operation.

→ Dual Role of Port 3

Port 3 has total 8 pins, P3.0, P3.1, P3.2, P3.3, P3.4, P3.5, P3.6 and P3.7 Pins 10, 11, 12, 13, 14, 15, 16 and 17. Port 3 can be used as an input port or output port. The port 3 does not need any pull up resistor.

### Que 1 (e)

Sol :-

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

```
void T1M1Delay (void);
```

```
void main (void) {
```

```
  while (1) {
```

```
    P1 = 0x55;
```

```
    T1M1Delay ();
```

```
    P1 = 0xAA
```

```
    T1Delay ();
```

```
  }
```

```
}
```

```
void T1Delay () {
```

```
  TMOD = 0x01;
```

```
  T1 = 0x00;
```

```
  TH1 = 0x35;
```

```
  TR1 = 1;
```

```
  while (TF == 0)
```

```
    TR1 = 0;
```

```
    TF1 = 0;
```

```
}
```

$FFFF - 3500H = CAFFH$   
 $= 51967 + 1 = 51968$

$51968 \times 1.085 \mu s = 56.384 ms$

is the approximate delay

56.384 ms



# Ques # 1 (F)

⑤

Sol:-

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

```
void T1M1Delay (void);
```

```
sbit mybit = P1^5;
```

```
void main (void) {
```

```
while (1) {
```

```
mybit = ~mybit;
```

```
T1M1Delay ();
```

```
}
```

```
}
```

```
void T1M1Delay (void) {
```

```
TMOD = 0x0100;
```

```
TL1 = 0xFD;
```

```
TH1 = 0x4B;
```

```
TR1 = 1;
```

```
while (TF == 0);
```

```
TR1 = 0;
```

```
TF1 = 0;
```

```
}
```

$$\rightarrow \text{FFFFH} - \text{4BFDH} = \text{B402H}$$

$$= 46082 + 1 = 46083$$

$$= 46083 \times 1.085 \mu\text{s} = \boxed{50\text{ms}}$$

## Quest# 02

Sol:-

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

```
Sbit button 1 = P1^0;
```

```
Sbit button 2 = P1^1;
```

```
Sbit out 1 = P3^0;
```

```
Sbit out 2 = P3^1;
```

```
void main ()
```

```
{  
    if (button 1 == 0)
```

```
{  
    out 2 = 1;
```

```
}  
    else
```

```
{  
    out 1 = 0;  
    out 2 = 0;
```

```
}
```

This code will be used for user 1.

For Second User

```
#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();
```

```
    num--;
```

```
}
```

```
}
```

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

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

```
delay();
```

```
num
```

```
{
```

```
{
```

```
    int convert();
```

```
{
```

```
    unsigned int num1 = 10;
```

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

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

```
}
```

```
void delay()
```

```
{
```

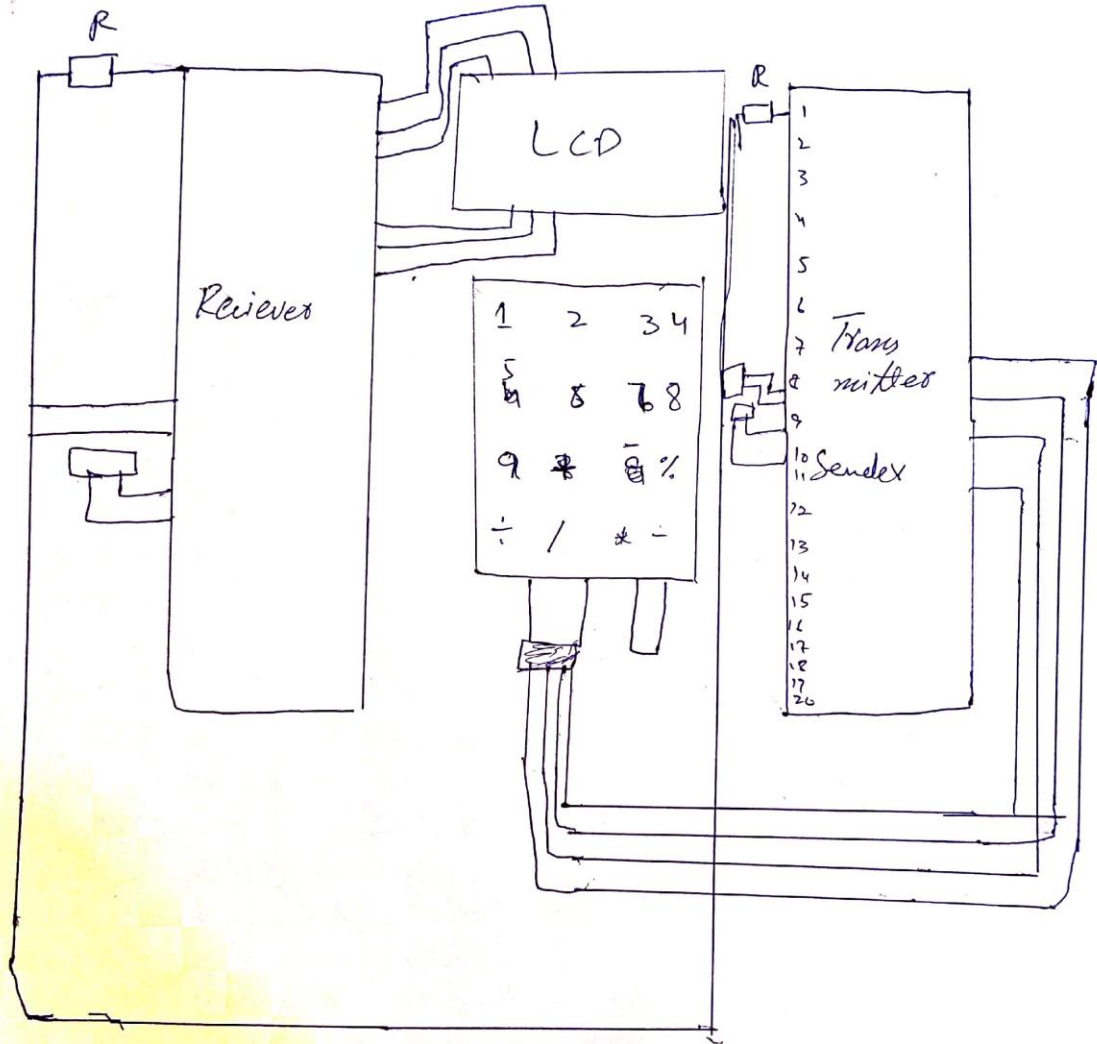
```
    unsigned int i, j;
```

```
    for (i=0; i<100; i++)
```

```
        for (j=0; j<500; j++)
```

```
}
```

# Circuit Diagram



## Que # 03

Sol :-

Code for Transmitter which will transmit  
it to Receiver

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

```
Sbit m1p = P2^0;
```

```
Sbit m1n = P2^1;
```

```
Sbit m2p = P2^2;
```

```
Sbit m2n = P2^3;
```

```
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;
```

```
    m2p = 0;
```

```
    m2n = 0;
```

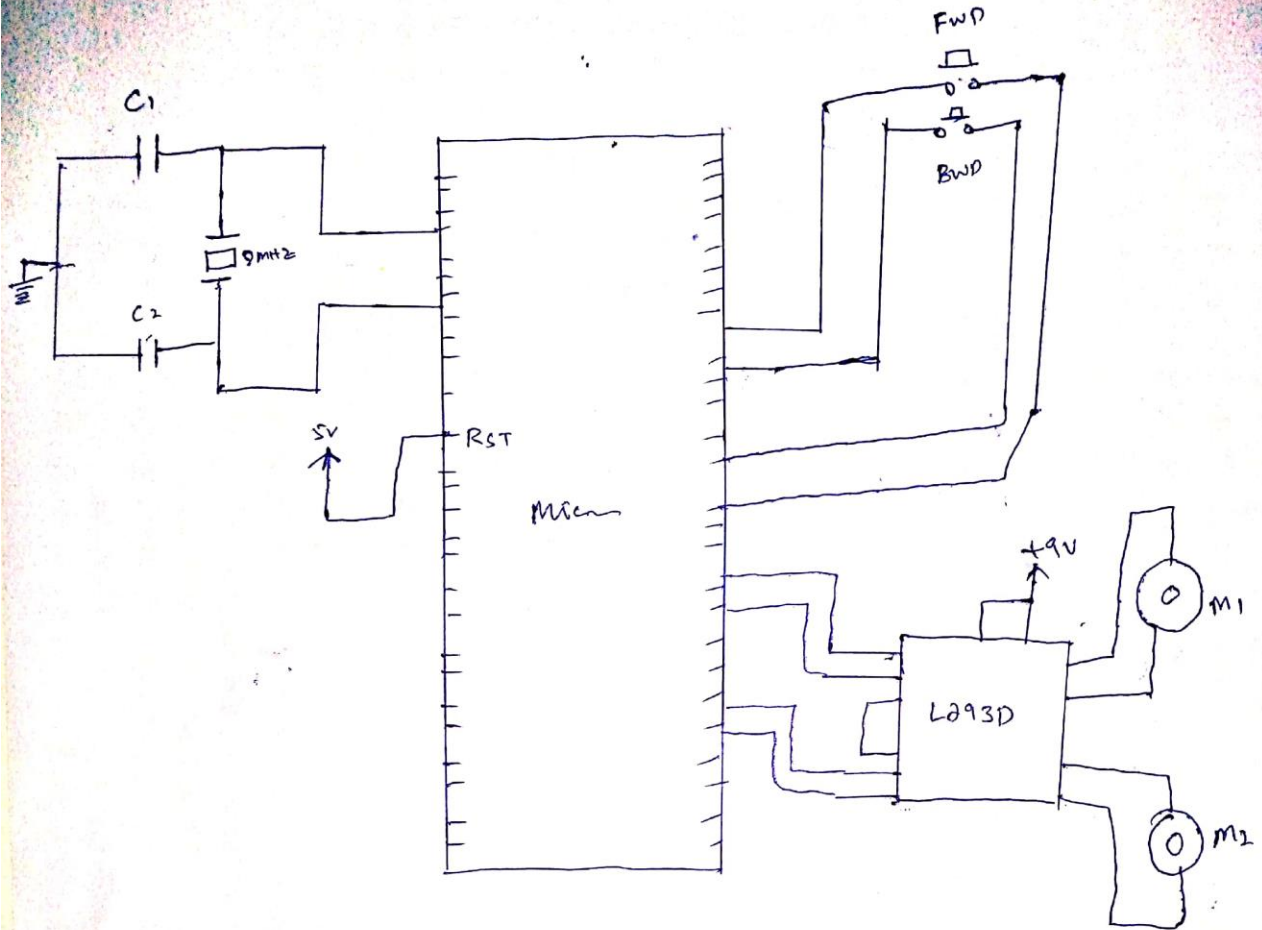
```
}
```

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 ( );
  }
}

```



Q # 04 (A)

Answer:-

Switch and LED 1 are connected as an AND Gate when both are "1" <sup>The LED 2</sup> ~~LED 2~~ will turn off. after delay of 100 ms it will turn on and if switch is on & LED 1 is off and if switch is on and LED 1 is off and LED 2 will turn on and after the delay it turn on and both the process will continue till the loop end.

Basically this code is using for blinking between LED 1 and LED 2 with 100ms delay.



Q# 4(B)

Sol:

```
#include <reg51.h>

Sbit SW1 = P3^1;

void delay (unsigned char x)
{
    unsigned int y, z;
    for (y=0; y<=x; y++)
        for (z=0; z<=1075; z++)
            ;
}

void main (void)
{
    while (1)
    {
        if (SW1 == 1)
            P2 = 0 y++;
        delay (1000);
    }
}
```

END OF PAPER