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PAPER :: Microcontroller

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QUESTION # 1

Write short notes of 4 lines Max or bullet points on the following with examples.

- a) Explain the difference between microprocessors and microcontrollers.

MICRO PROCESSOR :

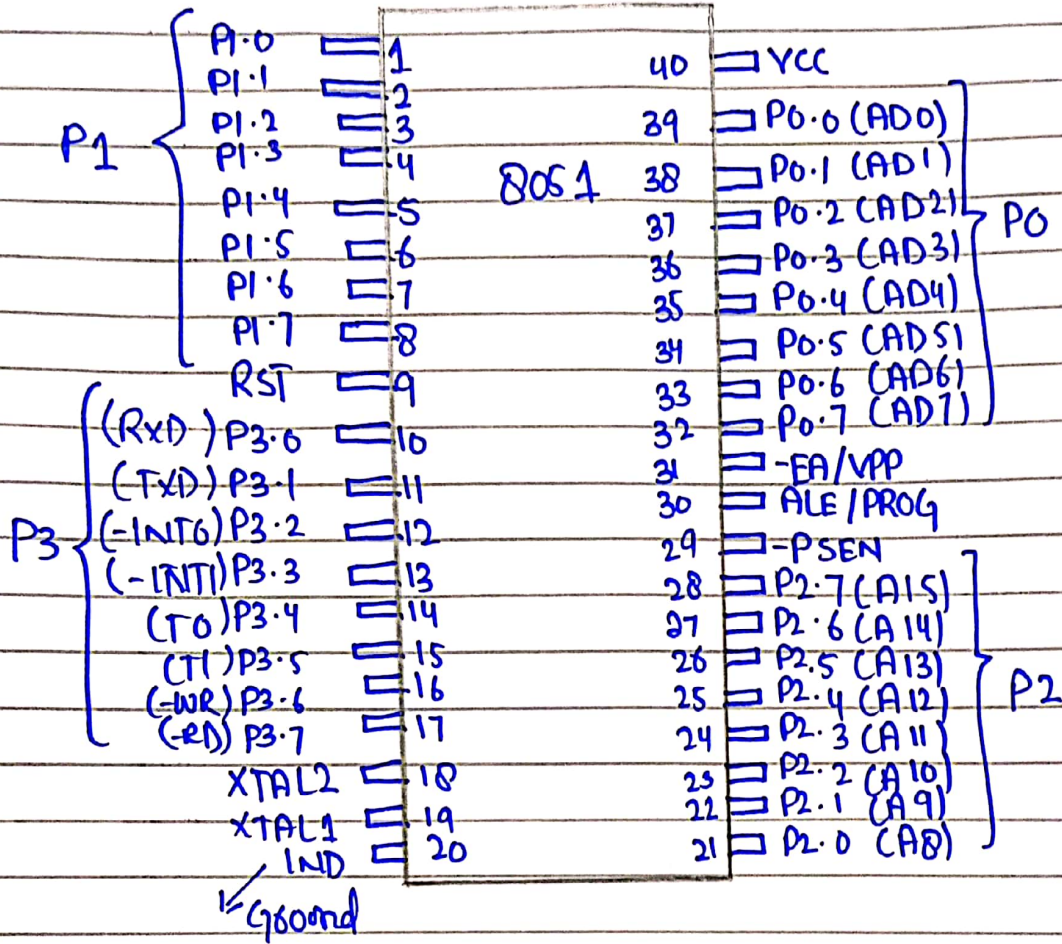
Microprocessor consists of only a central processing unit, whereas microcontroller contains a CPU, Memory, I/O all integrated into one chip.

Microprocessor uses an external bus to interface to RAM, ROM, and other peripherals, on the other hand, microcontroller uses an internal controlling bus.

- b) Draw the Pin diagram of the Intel 8051 microcontroller.

The Pin diagram of 8051 microcontroller consist of 40 pins as shown below. A total of 32 pins are set away into four ports such as P₀, P₁, P₂, P₃.

Where each port contains 8 pins. Therefore the microcontroller 8051's pin diagram and explanation is given below.



c) How many 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. All these counters count up on negative going edges at their inputs.

d) Explain the dual role of port 0, Port 2 and port 3.

PORT 0 & PORT 2

The 8051 microcontroller then multiplexes the input as address or data in order to save pins.

Dual role of port 2 - Besides working as I/O, Port P2 is also used to provide 16-bit address bus for external memory along with Port 0.

PORT 3

↳ It is similar to port 1, but has alternate uses.

↳ Each pin may be individually programmed as I/O or for alternate functions.

e) Make an accurate delay of 56.384 ms using timer 1 in mode 1.

```
#include <reg51.h>
void TI Delay (void);
void TI Delay ( ) {
    TMOD = 1x01; Mode 1
    TLO = 1x00;
    TH0 = 0x35;
    TR0 = 1;
    while (TFO == 0);
```

| |
|--|
| $FFFFH - 3500H = CAFFH$ $= 51967 + 1 = 51968$ $51968 \times 1.085 \mu s =$ 56.384 ms delay. |
|--|


```

TR0 = 0;
TFO = 0;
}
void main (void) {
while (1) {
P1 = 0x55;
TI Delay ();
P1 = 0xAA;
TI Delay ();
}
}

```

f) Make an accurate delay of 50ms using timer 1 in mode 1.

```

#include <reg 51.h>
void TIM1 Delay (void);
sbit mybit = P1^5;
void TIM1 Delay (void) {
TMod = 0x01;
TL0 = 0xFD;
TH0 = 0x4B;
TR0 = 0; TR
TFO; }

```

```

TR0 = 1;
while (TFO == 0);
TR0 = 0;
TFO = 0; }
void main (void) {
while (1) {
my bit = ~ my bit;
TIM1 Delay (); }
}

```

$$\begin{aligned}
& \text{FFFFH} - 4BFDH = \\
& \text{B402H} \\
& = 46082 + 1 = 46083 \\
& 46083 \times 1.085 \mu\text{s} \\
& = 50\text{ms}
\end{aligned}$$

QUESTION # 02

CODE :

```

#include <reg 51.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 1 = 1;
    }
    if (button 2 == 0)
    {
        out 2 = 1;
    }
    else
    {
        out 1 = 0;
        out 2 = 0;
    }
}

```

This code will be used for user 1.

Now user 2 code:

```

#include <reg 51.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 ();
            num ++;
            out = convert ();
        }

```

```

        if (in2 == 1)

```

```

        {
            delay ();
            num --;
            out = convert ();
        }
    }
}

```

```

int convert ()

```

```

{
    unsigned int num1 = num/10;
    unsigned int num2 = num/10;
    return ((num2 << 4) | num);
}

```

```

void delay ()

```

```

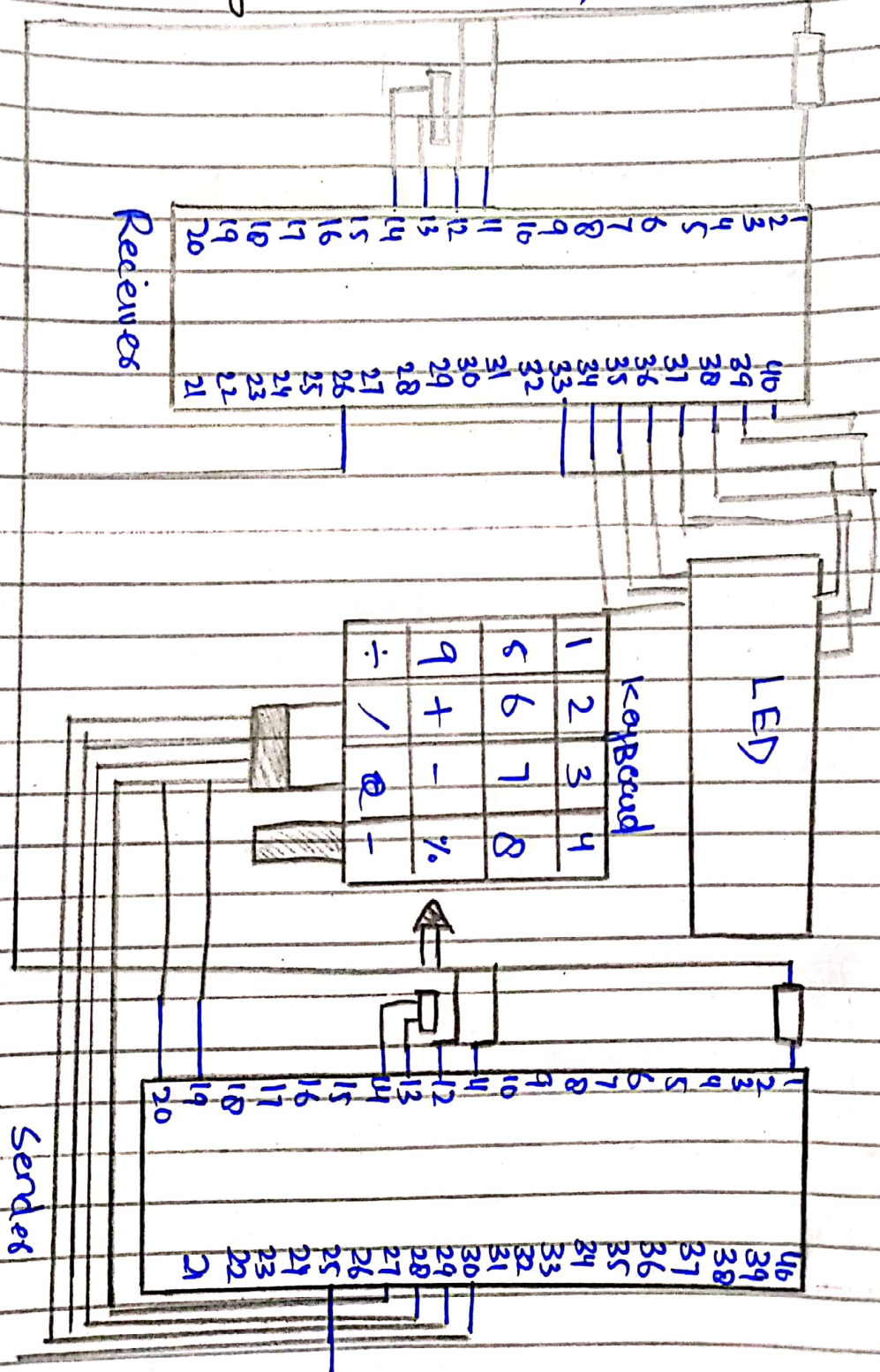
{

```

unsigned int i, j;

```
for (i=0; i<100; i++)
for (j=0; j<500; j++)
```

Circuit Diagram:



QUESTION #3

You are asked to make a small Remote controlled using two 8051 microcontroller. one will be your transmitter and the other receiver. Transmitter will send command for Forward and Reverse using two push buttons on the transmitter and 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.

```
#include <reg 51.h>
sbit m1p = P2^0;
sbit m1n = P2^1;
```

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

```
sbit F = P1^0;
sbit Bq = 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;
}

```

Now code for Receiver which will receive command from transmitter.

```

#include <reg51.h>
{
void main ( )
{
F = 0;
Bq = 0;
while (1)
}

```


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

```
    forward ( )
```

```
else if (Bq == 1)
```

```
    backward ( ) ;
```

```
else
```

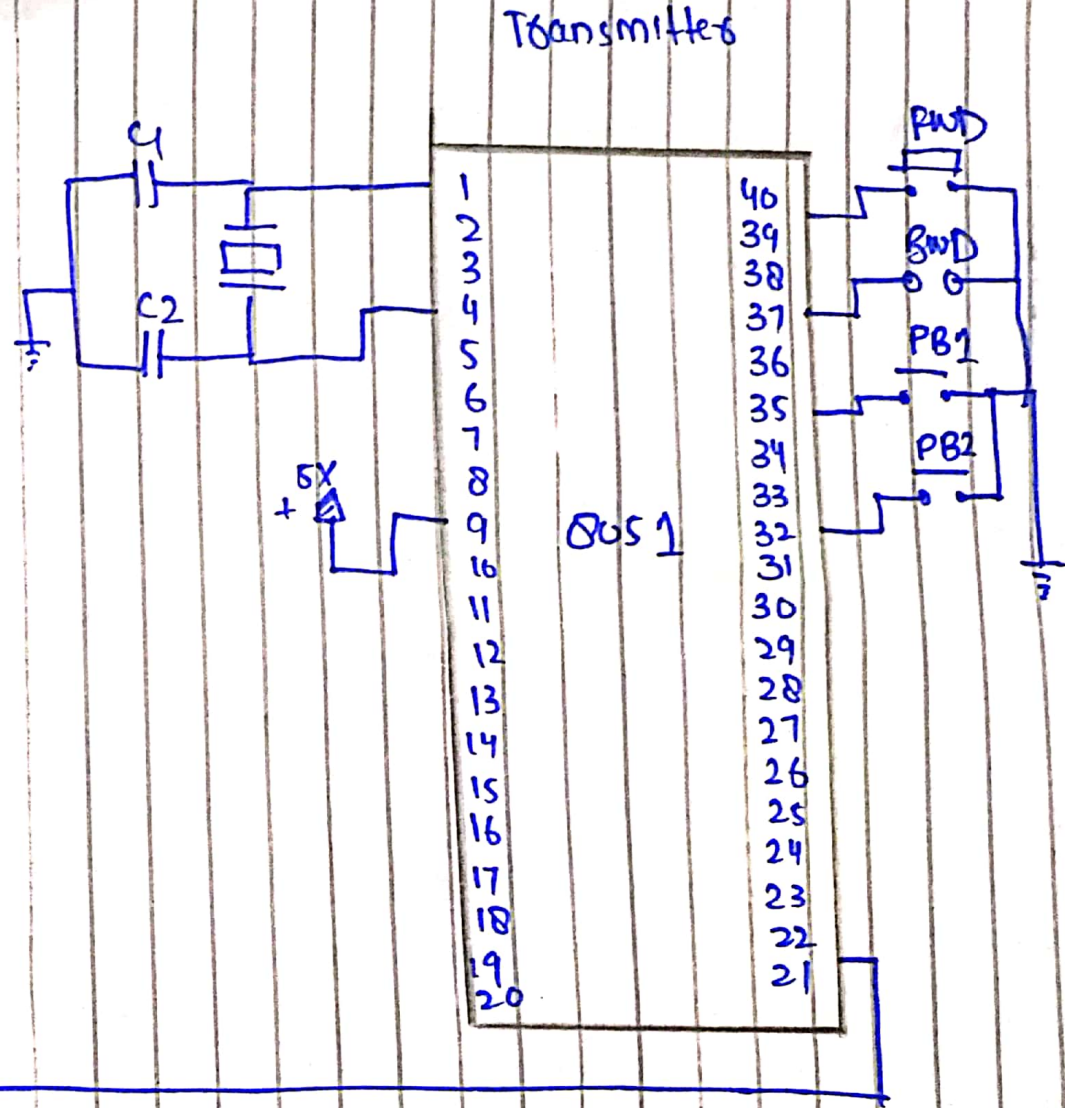
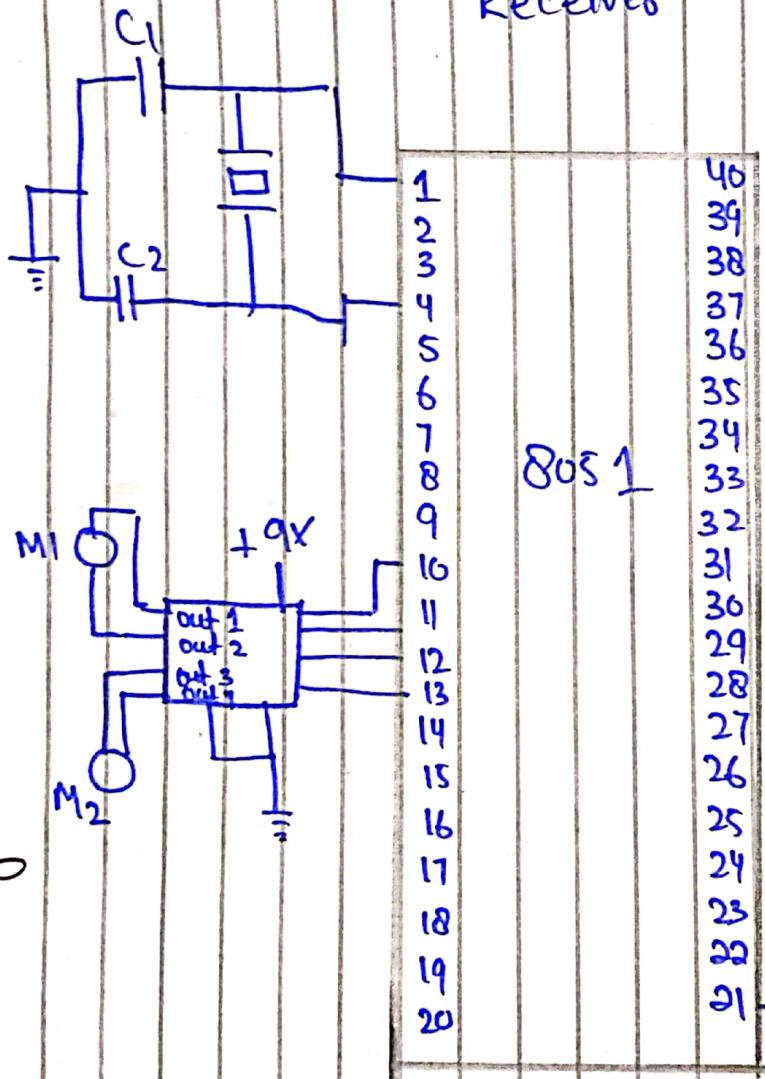
```
    stop ( ) ;
```

```
    }
```

```
    }
```

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Circuit diagram:



QUESTION #4

a)

ANSWER :

The above code is using for blinking the LED with 100ms delay.

We have given a condition if switch is on and LED 1 is on. so as a result LED 2 is off and we have a delay of 100ms. After 100ms delay the LED 2 is again on. Now if LED 1 is off and switch 1 is on also LED 2 is on with 100ms delay after this delay LED 2 again off.

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

b) Find errors in the following code if any.

Solution:

```
#include <reg 51.h>
sbit SW1 = P3^1;
void delay (unsigned char x)
```

```
{ unsigned int y, z;
```

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

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

```
}
```

```
void main( )
```

```
{ while (1)
```

```
{ if (SW1 == 1)
```

```
x = y++
```

```
delay (1000)
```

```
}
```

```
}
```