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Semester :: 8<sup>th</sup>

Subject :: Micro-controller

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Q1) (a) Write a short notes on the following with examples.

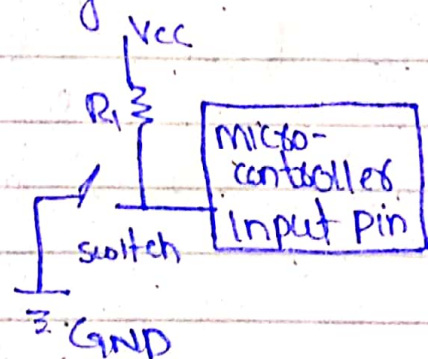
a) What is pull-up resistor? How does we use pull-up resistor with 8051 microcontroller? Draw the circuit diagram.

Ans) Pull-up resistor :-

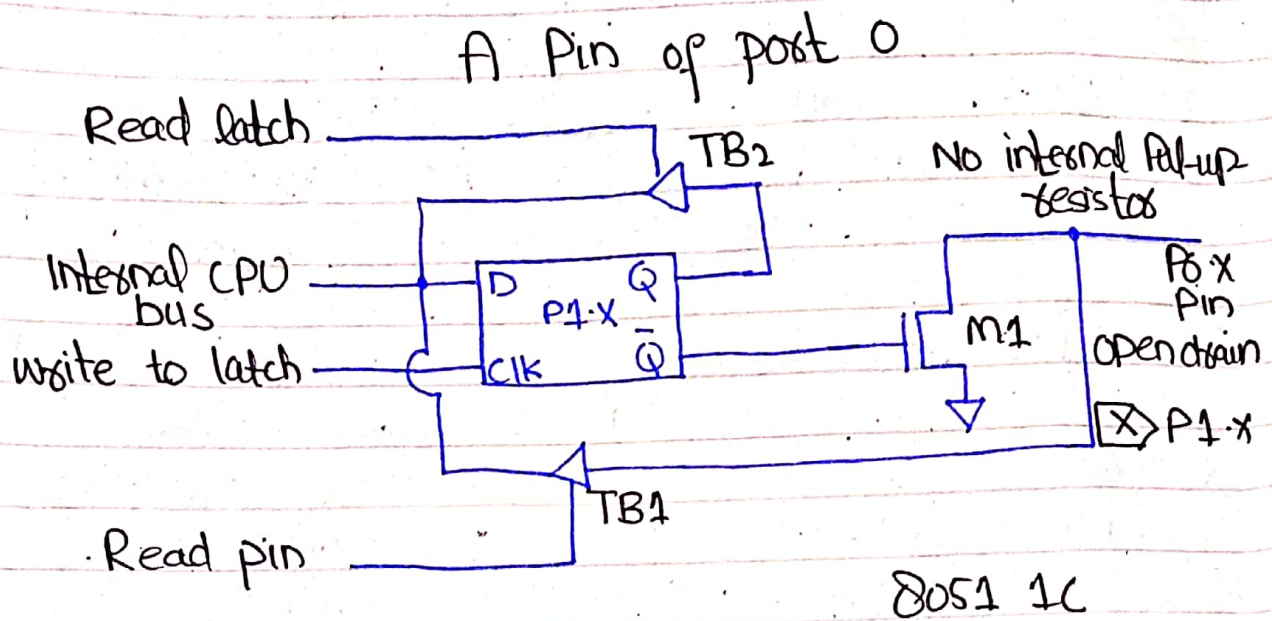
A pull-up resistor connects unused input pins (AND and NAND gates) to the dc supply voltage, ( $V_{CC}$ ) to keep the given input high. In electronic logic circuits, a pull-up resistor is a resistor used to ensure a known state for a signal. It is typically used in combination with components such as switches and transistors.

When the GPIO voltage level is low, then it is in high or high impedance state, then the pull-up resistor are used to ensure GPIO which is always in a valid state. Usually, the GPIO is assigned on a microcontroller as I/O.

CIRCUIT DIAGRAM







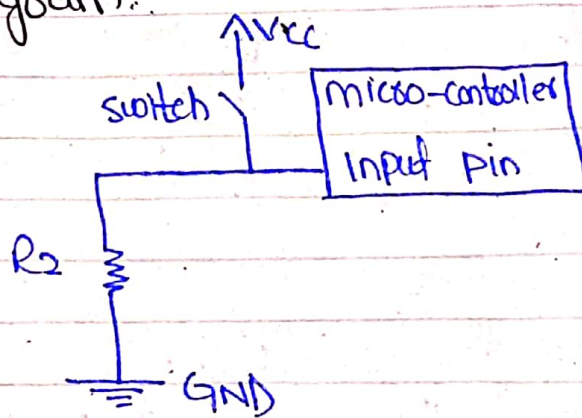
b) What is pull-down-resistor? How does we use pull-down-resistor with 8051 microcontroller? Draw the circuit diagram.

Ans) Pull-down-resistor:

A pull-down resistor connects unused input pins (OR and NOR gates) to ground, (0V) to keep the given input low. The resistance value for a pull-up-resistor is not usually that critical but must maintain the input pin voltage above  $V_{IH}$ .

When the GPIO voltage level is low, then it is in high or high impedance state, then the pull-up or pull-down resistors are used to ensure GPIO which is always are used to ensure GPIO is arranged on a microcontroller as I/O.

Circuit diagram:



c) How many hardware timers are present in 8052?

Ans). The 8051 has two timers T<sub>0</sub> and T<sub>1</sub>, which may be configured and used individually. The 8052 has an additional timer T<sub>2</sub>. All these counters count up on negative going edges at their inputs.



d) How many inputs/output ports are in an 89C51 microcontroller?

Ans) 8051 microcontroller have 4 I/O ports each of 8-bit, which can be configured as input or output. Hence total 32 input/output pins allow the microcontroller to be connected with the peripheral devices. Pin configuration i.e., the pin can be configured as 1 for input and 0 for output as per the logic state.

e) What is the difference between a microcontroller and a microprocessor?

Ans) 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) Convert the following to their respective bases.

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

Solution:

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

$$(89501)_{10} \rightarrow (256635)_8 \text{ Ans.}$$

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

Solution:



2	64101	1
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
	1	1

$$(64101)_{10} = (111101001100101)_2 \text{ Ans}$$

$$c) (9AB3)_{16} = (?_2)$$

Solutions:

$$\begin{array}{cccc}
 9 & A & B & 3 \rightarrow (0011) \\
 \downarrow & \downarrow & \downarrow & \\
 (1001) & (1010) & (1011) & 
 \end{array}$$

$$(9AB3)_{16} \Rightarrow (1001\ 1010\ 1011\ 0011)_2 \text{ Ans}$$

$$d) (1110100100111)_2 = ?_8$$

Solution :-

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

$$\begin{array}{cccccc} 001 & 110 & 100 & 100 & 111 \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 1 & 6 & 4 & 4 & 7 \end{array}$$

$$(1110100100111)_2 = (16447)_8 \text{ Ans.}$$

$$e) (101100001011)_2 = ?_{16}$$

Solution :-

Break into groups of four so

$$\begin{array}{ccc} 1011 & 0000 & 1011 \\ \downarrow & \downarrow & \downarrow \\ B & 0 & B \end{array}$$



$$(101100001011)_2 = (BOB)_{16} \text{ Ans.}$$

(Q2)

(a) code the following scenario.

Solution:

```
#include <reg 51-h>
sbit green led = P1^1
sbit red led = P2^2
void delay int (x);
sbit switch = 0;
```

int x,y;

void main ( )

```
{
  if (switch == 0) on state
    green led = 1;
    red led = 0;
}
```

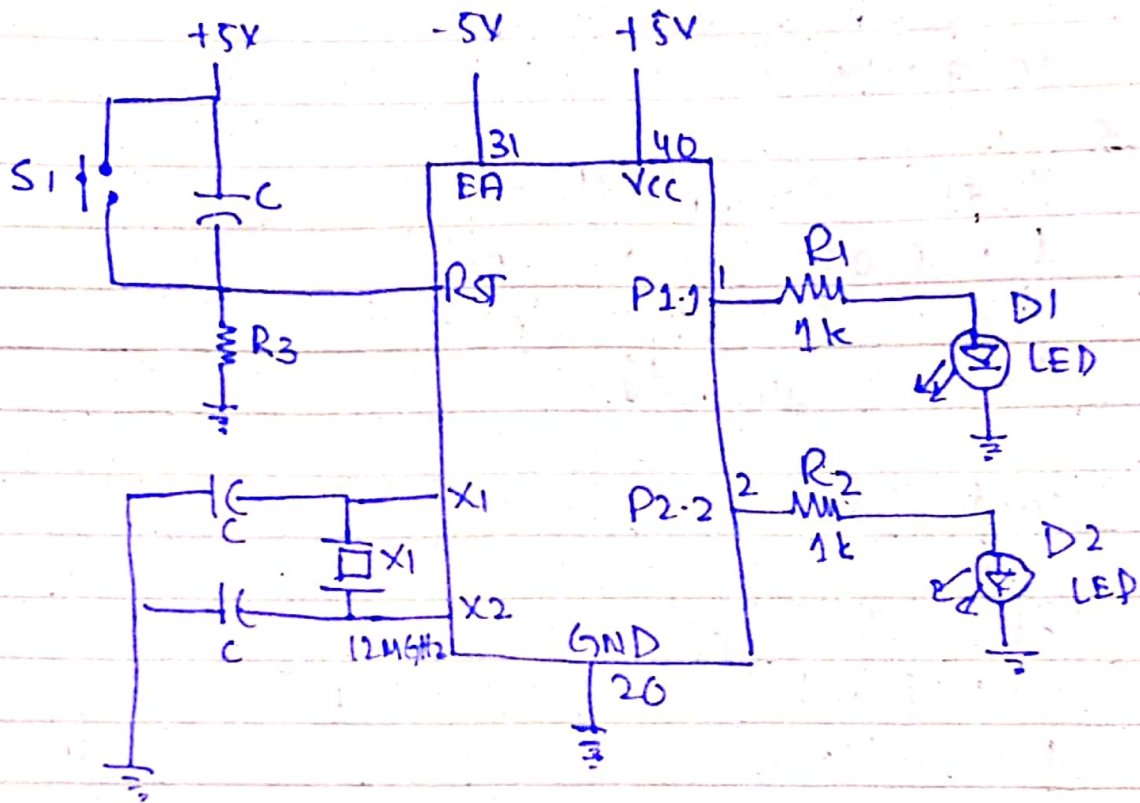
If else (switch == 1) off state

```
{
  green led = 0;
  red led = 1;
}
```

else

{  
 green led = 0 ;  
 red led = 0 ;  
 }

Circuit diagram :



b) code the following scenario:

Solution:



```

(7) #include <LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5);
int IR-1 = 5;
int IR-2 = 11;
int counter = 0;
int current state = 0;
int previous state = 1;
int IR-1-op;
int IR-2-op;
void main()

```

```

{
  Serial.begin(9600);
  pinMode(IR-1, Input);
  pinMode(IR-2, Input);
  lcd.begin(12, 11);
}

```

```

void loop() {

```

```

  lcd.setCursor(0, 0);
  lcd.print("No of cars: 99");
  lcd.setCursor(0, 1);
  lcd.print("Car");
  IR-1-op = digitalRead(IR-1);
  IR-2-op = digitalRead(IR-2);
  Serial.println(digitalRead(IR-2));

```

```

if

```

```

  (IR-1-op == High && IR-2-op == Low)
  {
    current state = 1;
  }

```

```

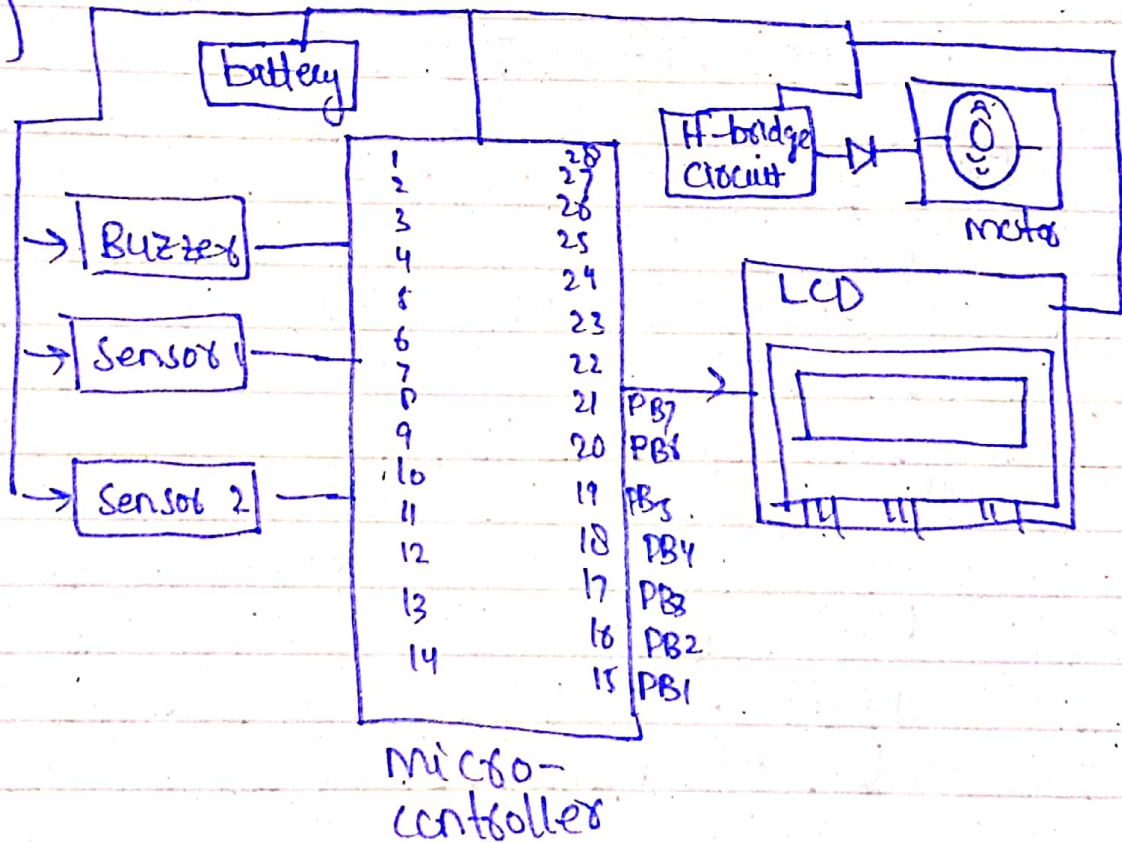
} else
    { current-state = 0; }
if { current state == 1 )
    { counter = counter + 1;
      lcd.print ("Enter"); }
if { current state == 1 )
    { counter = counter - 1;
      lcd.print ("Leave"); } }

```

```

Previous state -> current state :
delay (250);
serial print ln(counter);
}

```





(Q3) Identify errors in the following code if any.

```
#include <reg50.h>
sbit led = P210;
```

Solution:

```
#include <reg50.h>
sbit led = P217;
void delay (unsigned char) {
    unsigned y, z;
    for (y=0; y<y; y++)
        for (z=0; z<=1275; z++) }
void main ( )
{ while (1)
    led = 0;
    delay ( );
    led = 1;
    delay (350);
} }
```

Ans