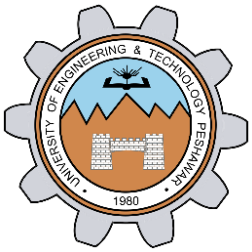
MICROPROCESSOR BASED SYSTEM DESIGN

TASK 3



Spring 2021

CSE307 MBSD

Submitted by: **Shah Raza**

Registration No. : **18PWCSE1658**

Class Section: **B**

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Student Signature: _____

Submitted to:

Dr. Bilal Habib

Sunday, May 1st, 2021

Department of Computer Systems Engineering

University of Engineering and Technology, Peshawar

Task:

A. Generate a signal on pin P1.1 having frequency equal to 80 Hz with a duty cycle of 10%.
B. When a user presses a button at P1.2 then frequency changes to 40Hz with a 20% duty cycle.
C. When a user again presses the same button then frequency changes to 20Hz with a duty cycle of 40%.
D. When a user again presses the same button then frequency changes to 10Hz with a duty cycle of 80%.
E. Show it on oscilloscope.
F. Each time a user presses a button the signal toggles from case A to B, then B to C, then C to D and finally from D to A, on every subsequent button press.
G. Program only in C

Problem Analysis:

Case A: To generate a signal of frequency 80Hz we need a time period of 1/80 s
So T = 1/f = 1/80 = 0.0125s
T = 12.5 ms
As Duty Cycle is 10%, so
P1.1 →ON (1.25 ms)
P1.1 →OFF(11.25 ms)

Case B: To generate a signal of frequency 40Hz we need a time period of 1/40 s
So T = 1/f = 1/40 = 0.025s
T = 25 ms
As Duty Cycle is 20%, so
P1.1 →ON (5 ms)
P1.1 →OFF(20 ms)

Case C: To generate a signal of frequency 20Hz we need a time period of 1/20 s
So T = 1/f = 1/20 = 0.05s
T = 50 ms
As Duty Cycle is 40%, so
P1.1 →ON (20 ms)
P1.1 →OFF(30 ms)

Case D: To generate a signal of frequency 10Hz we need a time period of 1/10 s
So T = 1/f = 1/10 = 0.10s
T = 100 ms
As Duty Cycle is 80%, so
P1.1 →ON (80 ms)
P1.1 →OFF(20 ms)

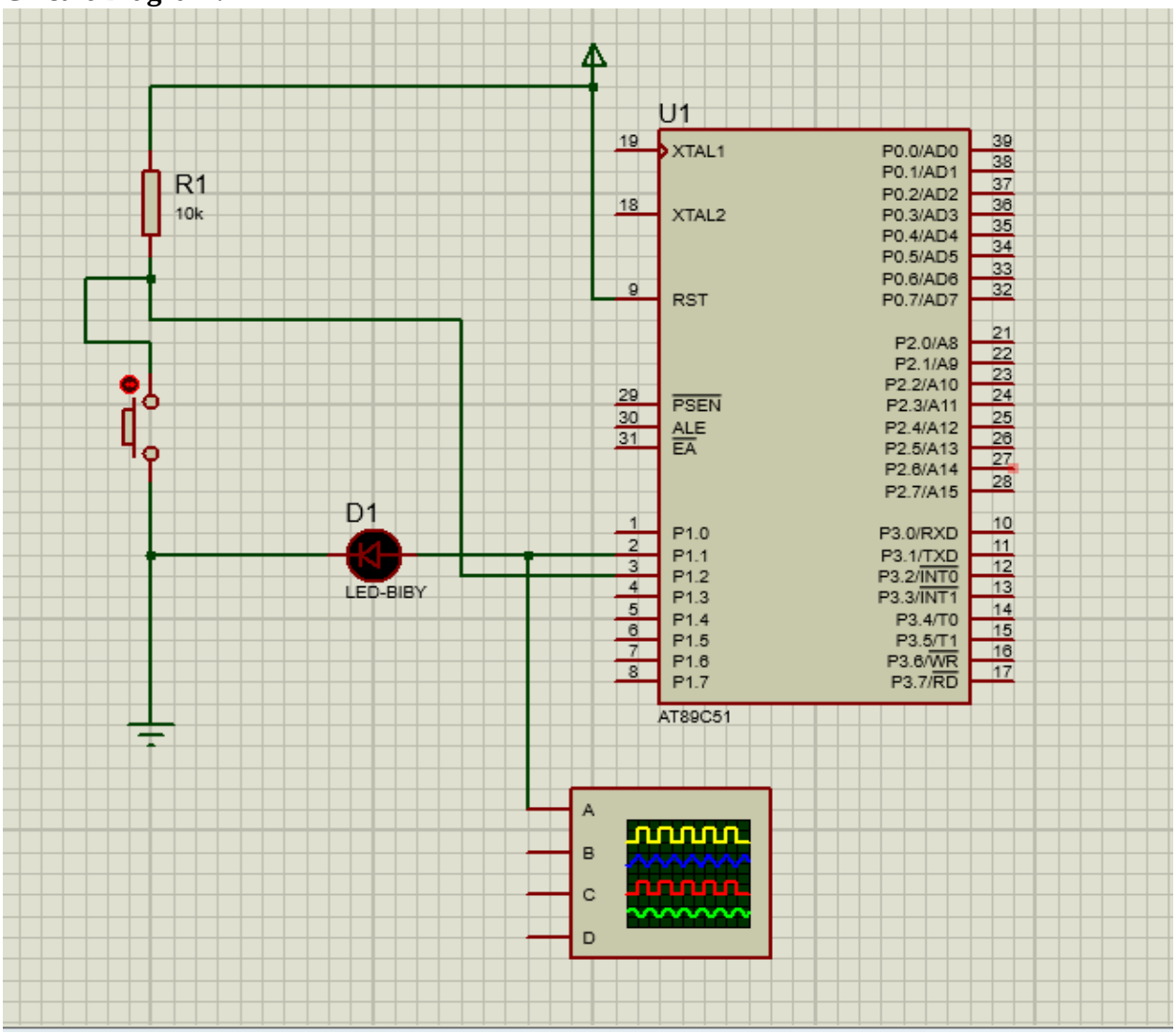
Code:

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

sbit P1_1 = P1^1;
sbit P1_2 = P1^2;

void Delay(unsigned int time)
{
    unsigned int i,j;
    for(i=0;i<time;i++)
        for(j=0;j<123;j++);
}

void Delay1()   //Delay of 0.25 ms
{
  unsigned int i;
  for(i=0;i<30;i++);
}


void main(void)
 {
  int check=0;
   P1_2 = 1;      //Configure for Input

  while (1)
  {
        if(P1_2==0)     //Button Pressed
          check++;
        switch(check%4)
        {
          case 0:
            P1_1 = 1;
            Delay(1);           //1ms Delay
            Delay1();           //0.25ms Delay
            P1_1 =0;
            Delay(11);          //11ms Delay
            Delay1();           //0.25ms Delay
            break;
          case 1:
            P1_1 = 1;
            Delay(5);           //5ms Delay
            P1_1 =0;
            Delay(20);          //20ms Delay
            break;
          case 2:
            P1_1 = 1;
            Delay(20);          //20ms Delay
```

```
            P1_1 =0;
            Delay(30);          //30ms Delay
            break;
          case 3:
            P1_1 = 1;
            Delay(80);          //80ms Delay
            P1_1 =0;
            Delay(20);          //20ms Delay
            break;
        }
  }
}
```

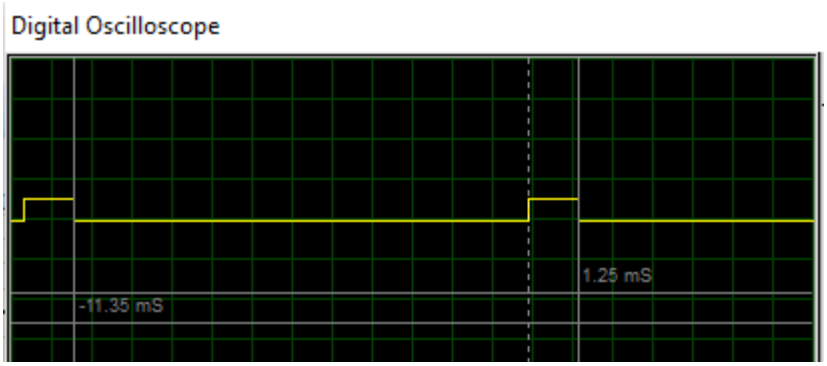
Output / Graphs / Plots / Results:

Circuit Diagram:

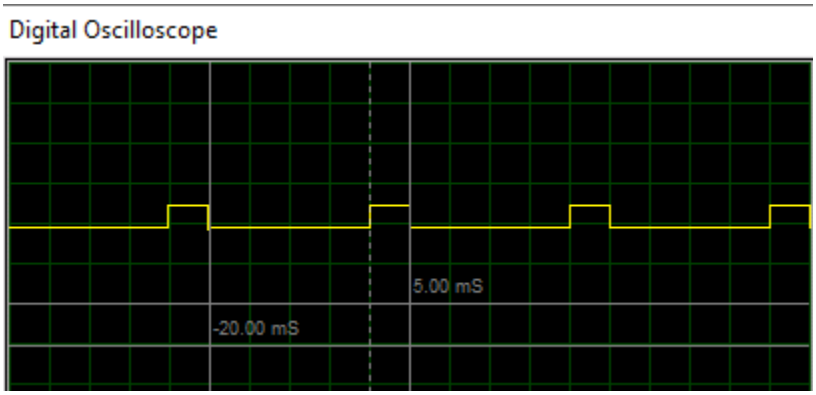


Oscilloscope Verification:

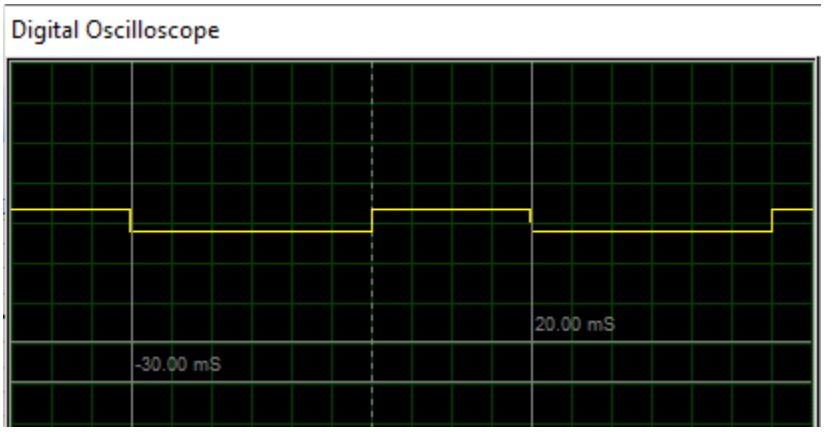
Case A (Without Pressing the Button):



Case B (After Pressing the Button):



Case C (Pressing the Button for the 2nd Time):



Case D (Pressing the Button for the 3rd Time):