**University of Engineering and Technology, Peshawar**

Department of Computer Systems Engineering.

*Course : CSE-303 Microprocessor Based System Design*



**Zainab Khalid 19** PWCSE **1743**

Section A

Batch 21 (Spring\_2022)

**Submitted to** Dr, Bilal Habib

**TASK 4:**

**Design a system, where the Software in C will generate, a signal of**

**A. 0.5KHz with a duty cycle of 25% on P2.0 pin.**

**B. Whenever a user presses a button at (P3.2), the signal toggles to 1KHz with a duty cycle**

**of 50%.**

**C. Again, pressing the same button will generate a signal of 2KHz with a duty cycle of 75%.**

**A third time button press will result in the generation of case A and so on.**

**• Draw the schematic diagram showing clearly the button circuit and oscilloscope.**

**• Draw the timing diagram with cursors clearly showing the time period with**

**appropriate units.**

**• Assuming oscillator clock of 24MHz is used.**

**• Use timer interrupt.**

**Part # A**

**Frequency=24MHz**

Generate signal of frequency = 0.5K Hz.

duty cycle=25%

Time period is,

t=1/f , t=1/0.5K , t=2ms

Duty cycle = [(uptime) / (total time)] \* 100

uptime=[(duty cycle / 100)] \*(total time)

uptime= (25 / 100) \*2ms

uptime= 0.5ms

uptime=2\*500usec=1000

(1000)10=(3E8)16

UP\_DELAY= ffff-3E8

=( FC17)16

so off-time=total time - uptime

off-time=(2-0.5)ms

off-time=1.5msec

off-time=2\*1500usec=3000us

(3000)10=(BB8)16

UP\_DELAY= ffff-BB8

=( F447)16

**Part # B**

Generate signal of frequency = 1KHz.

duty cycle=50%

Time period is,

t=1/f , t=1/1K , t=1ms

Duty cycle = [(uptime) / (total time)] \* 100

uptime=[(duty cycle / 100)] \*total time

uptime= (50 / 100) \*1ms

uptime= 0.5ms

uptime= 2\*500usec =1000us

(1000)10=(3E8)16

UP\_DELAY= ffff-3E8

=( FC17)16

so off-time=total time - uptime

off-time=(1-0.5)ms

off-time=0.5ms

off-time=2\*500us=1000us

(1000)10=(3E8)16

UP\_DELAY= ffff-3E8

=( FC17)16

**Part # C**

Generate signal of frequency = 2KHz.

duty cycle=75%

Time period is,

t=1/f , t=1/2K , t=0.5ms

Duty cycle = [(uptime) / (total time)] \* 100

uptime=[(duty cycle / 100)] \*total time

uptime= (75 / 100) \*0.5ms

uptime= 0.375ms =375us

uptime= 2\*375us=750us

(750)10=(2EE)16

UP\_DELAY= ffff-2EE

=( FD11)16

so off-time=total time - uptime

off-time=(0.5-0.375) ms

off-time=0.125ms=125us

off-time=2\*125us=250us

(250)10=(FA)16

UP\_DELAY= ffff-FA

=( FF05)16

**CODE:**

#include<reg51.h>

#include<stdio.h>

sbit interrupt\_button =P3^2; //externalinterrupt at pin 12

sbit led=P2^0;

int count=0;

void start\_timer(void)

{

TR0=1; //starting timer 0

}

void ext\_int\_0(void)interrupt 0 //ISR for external interrupt0 INT0 when button is pressed

{

count=count+1;

}

void timer\_int(void)interrupt 3 // ISR for roll over condition

{

switch(count%3)

{

case 0:

if(led==1)

{

led=0;

TH0=0xF4;

TL0=0x44;

}

else

{

led=1;

TH0=0xFC;

TL0=0x17;

}

break;

case 1:

if(led==1)

{

led=0;

TH0=0xFC;

TL0=0x17;

}

else

{

led=1;

TH0=0xFC;

TL0=0x17;

}

break;

case 2:

if(led==1)

{

led=0;

TH0=0xFB;

TL0=0x1D;

}

else

{

led=1;

TH0=0xFD;

TL0=0x11;

}

break;

}

}

void init\_timer(void)

{

TMOD=0x01; //mod 1 timer

TH0=0xFC;

TL0=0x17;

IE=0x83; //timer 0 overflowinterrupt and externalinterrupt 0

INT0=1; //externalinterrupt at pin 3.2

}

void main(void)

{

led=1;

interrupt\_button=1; //configure INT0 pin as an input

init\_timer();

start\_timer();

while(1)

{

}

}

**OUTPUT:**







