

Name:

Roll Num.:

1. (2 marks) Write a subroutine to generate a delay of 1 sec. using the Timer T0 in Mode 1 and interrupt. Demonstrate your code by toggling one of the LEDs on the Pt-51 board at a rate of 1 sec.
2. Problem statement: In this part you will write code to measure the pulse width (T_{on}) of an external signal connected to the port P3.2 of Pt-51 and display it on the LCD. You need to use the gating feature of the timer to measure pulse width of an input signal (square wave from a function generator). Configure timer T0 to be gated by an external signal. Ensure that the timer starts at the rising edge and detects the falling edge using the negative edge triggered interrupt (INT0). The measurement of pulse width may be done once every four pulses (ON periods of the square wave) to ensure that the computation and display routines get completed before the next measurement.

Note:

1. Refer to Sec. 2 and Sec.6 of the handout “Notes on 8051 Timers” by Prof. D. K. Sharma.
2. Initialize both TH0 and TL0 to 00h.
3. Use timer interrupt for detecting overflow.

- (a) (3 marks) For such an application provide configuration of the following registers:

Sl No	Register	Value in hex
1	IE	
2	TMOD	
3	TCON	

- (b) (5 marks) Write an ISR to record the timer count corresponding to the pulse width following the guidelines mentioned in the problem statement. Demonstrate it using Keil to your TA.
- (c) (2 marks) Write a subroutine to display “PULSE WIDTH” on the first line and “COUNT IS XXXXXX” (in hex) on the second line of the LCD. Assuming T0 is used, display of count should be of 6 digits. First 2 digits showing the number of times the timer has overflowed, next 2 digits showing TH0 value, and the next 2 digits showing TL0 value.
- (d) Set up the function generator to generate a square wave with an amplitude of 3 V and frequency 500 Hz. Verify the same using a DSO before connecting it to the Pt-51, otherwise the board will get damaged.
- (e) (5 marks) Demonstrate your code by measuring the pulse width of a square wave from the function generator. Change the frequency to 5 Hz and demonstrate the same to your TA by displaying the corresponding COUNT on the LCD.
- (f) (3 marks) Display the pulse width in milliseconds (corresponding to the COUNT) on the LCD. Use TH0 and overflow for estimating the approx pulsewidth in milliseconds.