Unit III
Timer Programming, Serial Port Programming, Interfacing LCD, DAC and Sensor

1	Name the timer/ counter available in 8051. Explain the working of the timer/ counter in brief.
2	Which are the different Special Function Registers associated with Timer/ Counter operation.
3	With a neat diagram explain each bit of TMOD register.

4	Indicate which mode and which timer are selected for each of the following.
	  a) TMOD= 0x10
	  b) TMOD= 0x01
	  c) TMOD= 0x11
	  d) TMOD= 0x20
	  e) TMOD= 0x02

5	Find the timer's clock frequency and time period for the following XTAL frequencies:
	  a) 11.0592 MHz
	  b) 16 MHz

6	Load TMOD with appropriate value to configure:
	  a) Timer 0 in Mode 0
	  b) Timer 1 in Mode 0
	  c) Timer 0 in Mode 0, Timer 1 in Mode 0
	  d) Timer 0 in Mode 0, Timer 1 in Mode 1
	  e) Timer 0 in Mode 0, Timer 1 in Mode 2
	  f) Timer 0 in Mode 1, Timer 1 in Mode 2
	  g) Timer 0 in Mode 1, Timer 1 in Mode 2
	  h) Timer 0 in Mode 1, Timer 1 in Mode 2
	  i) Timer 0 in Mode 2, Timer 1 in Mode 2
	  j) Timer 0 in Mode 2, Timer 1 in Mode 2
	  k) Timer 0 in Mode 2, Timer 1 in Mode 2

7	Explain with a neat block diagram the characteristics and working of Timer in Mode1.
8	List out the steps to program timer in mode1 to generate delay.
9	Explain with a neat block diagram the characteristics and working of Timer in Mode2.
10	List out the steps to program timer in mode2 to generate delay.
11	Write an 8051 C program to toggle all the bits of port P1 continuously with some delay in between. Use Timer 0, 16-bit mode to generate the delay.
12	Write an 8051 C program to toggle only bit P1.5 continuously every 50 ms. Use Timer 0, mode 1 (16-bit) to create the delay.
13	Write an 8051 C program to toggle all bits of P2 continuously every 500 ms. Use Timer 1, mode 1 to create the delay.
14	A switch is connected to pin P1.2. Write an 8051 C program to monitor SW and create the

	following frequencies on pin P1.7: SW=0: 500Hz SW=1: 750Hz, use Timer 0, mode 1 for both of them.
15	Write an 8051 C program to toggle only pin P1.5 continuously every 250 ms. Use Timer 0, mode 2 (8-bit auto-reload) to create the delay.
16	Write an 8051 C program to create a frequency of 2500 Hz on pin P2.7. Use Timer 1, mode 2 to create delay.
17	Assume that a 1-Hz external clock is being fed into pin T1 (P3.5).Write a C program for counter 1 in mode 2 (8-bit auto reload) to count up and display the state of the TL1 count on P1. Start the count at 0H.
18	Assume that a 1-Hz external clock is being fed into pin T0 (P3.4). Write a C program for counter 0 in mode 1 (16-bit) to count the pulses and display the state of the TH0 and TL0 registers on P2 and P1,respectively.
19	With XTAL = 11.0592 MHz, find the TH1 value needed to have the following baud rates. (a) 9600 (b) 2400 (c) 1200
20	Explain each bit of SCON register.
21	List out the steps in programming the 8051 to transfer character bytes serially.
22	List out the steps in programming the 8051 to receive character bytes serially.
23	Write a C program for 8051 to transfer the letter "A" serially at 4800 baud continuously. Use 8-bit data and 1 stop bit.
24	Write an 8051 C program to transfer the message "YES" serially at 9600 baud, 8-bit data, 1 stop bit. Do this continuously.
25	Program the 8051 in C to receive bytes of data serially and put them in P1. Set the baud rate at 4800, 8-bit data, and 1 stop bit.
26	Interface 16x2 LCD with 8051 Microcontroller and develop an Embedded 'C' program to display the string "GITCSE".

27	Interface DAC 0800 with 8051 Microcontroller and develop an Embedded 'C' program to generate the following waveforms
	    a) Square/ rectangular wave
	    b) Triangular wave
	    c) Ramp wave
	    d) Staircase wave

28	Interface DAC 0800 with 8051 Microcontroller and develop an Embedded 'C' program to generate the rectangular waveform with 65% duty cycle on P0. Assume XTAL= 11.0592 MHz and T=100ms.

| 29 | Interface Temperature Sensor with 8051 Microcontroller and develop an Embedded 'C' program to convert the temperature into digital value with the help of ADC 0808/09. |