**Unit III**

**Timer Programming, Serial Port Programming, Interfacing LCD, DAC and Sensor**

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| 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.   1. TMOD= 0x10 2. TMOD= 0x01 3. TMOD= 0x11 4. TMOD= 0x20 5. TMOD= 0x02 |
| 5 | Find the timer’s clock frequency and time period for the following XTAL frequencies:   1. 11.0592 MHz 2. 16 MHz |
| 6 | Load TMOD with appropriate value to configure:   1. Timer 0 in Mode 0 2. Timer 1 in Mode 0 3. Timer 0 in Mode 0, Timer 1 in Mode 0 4. Timer 0 in Mode 0, Timer 1 in Mode 1 5. Timer 0 in Mode 0, Timer 1 in Mode 2 6. Timer 0 in Mode 1, Timer 1 in Mode 2 7. Timer 0 in Mode 1, Timer 1 in Mode 2 8. Timer 0 in Mode 1, Timer 1 in Mode 2 9. Timer 0 in Mode 2, Timer 1 in Mode 2 10. Timer 0 in Mode 2, Timer 1 in Mode 2 11. Timer 0 in Mode 2, Timer 1 in Mode 2 |
| 7 | 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. |
| 8 | 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. |
| 9 | 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. |
| 10 | Assume that a 1-Hz external clock is being fed into pin T0 (P3.4). Write a C program for counter 1 in mode 1 (16-bit) to count the pulses and display the state of the TH0 and TL0 registers on P2 and P1,respectively. |
| 11 | Explain each bit of SCON register. |
| 12 | List out the steps in programming the 8051 to transfer character bytes serially. |
| 13 | List out the steps in programming the 8051 to receive character bytes serially. |
| 14 | Write an 8051 C program to transfer the message “YES” serially at 9600 baud, 8-bit data, 1 stop bit. Do this continuously. |
| 15 | 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. |
| 16 | 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. |
| 17 | Define IoT & explain its characteristics. |
| 18 | Explain in detail a generic block diagram of an IoT Device. |
| 19 | Describe an example of IoT Service that uses Publish-Subscribe communication model. |
| 20 | Describe an example of IoT Service that uses Request Response communication model |
| 21 | Briefly explain all the six IoT levels. |
| 22 | Illustrate the Home Automation IoT application w.r.t. Level-1 Deployment model |
| 23 | Illustrate the weather monitoring IoT application w.r.t . suitable Deployment level |