**Question Bank of Microcontroller:**

1.  Assume that XTAL = 11.0592 MHz for the following program,
    state (a) what this program does, (b) compute the frequency used by timer 1 to set the baud rate, and (c) find the baud rate of the data transfer.

2.  Assume that the 8051 serial port is connected to the COM port of IBM PC, and on the PC, we are using the terminal.exe program to send and receive data serially. P1 and P2 of the 8051 are connected to LEDs and switches, respectively. Write an 8051 program to (a) send to PC the message "We Are Ready", (b) receive any data send by PC and put it on LEDs connected to P1, and (c) get data on switches connected to P2 and send it to PC serially. The program should perform part (a) once, but parts (b) and (c) continuously, use 4800 baud rate.

3.  Write a program for the 8051 to receive bytes of data serially, and put them in P1, set the baud rate at 4800, 8-bit data, and 1 stop bit.

4.  Write a program for the 8051 to transfer "YES" serially at 9600 baud, 8-bit data, 1 stop bit, do this continuously.

5.  Write a program for the 8051 to transfer letter "A" serially at 4800 baud, continuously.

6.  With XTAL = 11.0592 MHz, find the TH1 value needed to have the following baud rates.    (a) 9600         (b) 2400         (c) 1200.

7.  Assume XTAL = 11.0592 MHz, write a program to generate a square wave of 50 kHz frequency on pin P2.3.

8.  Assume that XTAL = 11.0592 MHz, write a program to generate a square wave of 2 kHz frequency on pin P1.5.

9.  Assume that XTAL = 11.0592 MHz. What value do we need to load the timer's register if we want to have a time delay of 5 ms (milliseconds)? Show the program for timer 0 to create a pulse width of 5 ms on P2.3.

10. Modify TL and TH in Example 9-7 to get the largest time delay possible. Find the delay in ms. In your calculation, exclude the overhead due to the instructions in the loop.

11. Indicate which mode and which timer are selected for each of the following. (a) MOV TMOD, #01H (b) MOV TMOD, #20H (c) MOV TMOD, #12H

12. Find the TH1 value (in both decimal and hex ) to set the baud rate to each of the following. (a) 9600 (b) 4800 if SMOD=1. Assume that XTAL 11.0592 MHz

13. Find the baud rate if TH1 = -2, SMOD = 1, and XTAL = 11.0592 MHz. Is this baud rate supported by IBM compatible PCs?

14. Write a program to send the message "The Earth is but One Country" to serial port. Assume a SW is connected to pin P1.2. Monitor its status and set the baud rate as follows: SW = 0, 4800 baud rate SW = 1, 9600 baud rate Assume XTAL = 11.0592 MHz, 8-bit data, and 1 stop bit.

15. Show the instructions to (a) enable the serial interrupt, timer 0 interrupt, and external hardware interrupt 1 (EX1),and (b) disable (mask) the timer 0 interrupt, then (c) show how to disable all the interrupts with a single instruction.

16. Write a program that continuously get 8-bit data from P0 and sends it to P1 while simultaneously creating a square wave of 200 μs period on pin P2.1. Use timer 0 to create the square wave. Assume that XTAL = 11.0592 MHz.

17. Assume that the INT1 pin is connected to a switch that is normally high. Whenever it goes low, it should turn on an LED. The LED is connected to P1.3 and is normally off. When it is turned on it should stay on for a fraction of a second. As long as the switch is pressed low, the LED should stay on.

18. What is the difference between the RET and RETI instructions? Explain why we cannot use RET instead of RETI as the last instruction of an ISR.

19. Write a program in which the 8051 reads data from P1 and writes it to P2 continuously while giving a copy of it to the serial COM port to be transferred serially. Assume that XTAL=11.0592. Set the baud rate at 9600.

20. Write a program in which the 8051 gets data from P1 and sends it to P2 continuously while incoming data from the serial port is sent to P0. Assume that XTAL=11.0592. Set the baud rata at 9600.

21. Write a program using interrupts to do the following:
    (a) Receive data serially and sent it to P0,
    (b) Have P1 port read and transmitted serially, and a copy given to P2,
    (c) Make timer 0 generate a square wave of 5kHz frequency on P0.1. Assume that XTAL-11,0592. Set the baud rate at 4800.

21. A given memory chip has 12 address pins and 4 data pins. Find: (a) The organization, and (b) the capacity.

22. A 512K memory chip has 8 pins for data. Find: (a) The organization, and (b) the number of address pins for this memory chip.

23. For ROM chip 27128, find the number of data and address pins.

24. Assume that we have 4 bytes of hexadecimal data: 25H, 62H, 3FH, and 52H.(a) Find the checksum byte, (b) perform the checksum operation to ensure data integrity, and (c) if the second byte 62H has been changed to 22H, show how checksum detects the error.

25. Discuss the number of pins set aside for address in each of the following memory chips.
    (a) 16K×4 DRAM (b) 16K×4 SRAM

26. Discuss the program ROM space allocation for each of the following cases.
    (a) EA = 0 for the 8751 (89C51) chip.
    (b) EA = Vcc with both on-chip and off-chip ROM for the 8751.
    (c) EA = Vcc with both on-chip and off-chip ROM for the 8752.

27. An external ROM uses the 8051 data space to store the look-up table (starting at 1000H) for DAC data. Write a program to read 30 Bytes of these data and send it to P1.

28. Show the design of an 8031-based system with 8K bytes of program ROM and 8K bytes of data ROM.

29. Assume that we need an 8031 system with 16KB of program space, 16KB of data ROM starting at 0000, and 16K of NV-RAM starting at 8000H. Show the design using a 74LS138 for the address decoder.

30. Write an 8051 C program to send letters 'M', 'D', and 'E' to the LCD using the busy flag method.

**Assignment of Microcontroller:**

# Assignment 1

1. Write the  differences between a microprocessor and microcontroller.
2. Explain all  addressing mode with example.
3. Draw and explain the internal structure of microcontroller 8051
4. Explain the different register used in microcontroller.
5. What are the different types of directives used in microcontroller

# Assignment 2

1. Draw and explain IC 8051
2. Explain the PSW register in detail
3. Explain different role of PORT 3 in detail.
4. Explain the structure of Assembly Language Instruction. Write a program to add 25H and 34H which are stored in register R5 and R7.
5. Explain the program counter and the rom space of 8051

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