**Chapter 1**
**Questions and Assignments**

1.1 List the components of a microprocessor-based system.

1.2 What is the difference between a microprocessor and a microcontroller?

1.3 Explain the difference between the terms: microprocessor, MPU, and CPU.

1.4 List the two major categories of memory and explain their functions.

1.5 Define the terms: bit, byte, and word.

1.6 Explain the functions of input and output devices with examples.

1.7 Is a scanner connected to a PC an input device or an output device?

1.8 Explain the functions of address bus, data bus, and control lines.

1.9 Explain why the address bus is unidirectional and the data bus is bi-directional.

1.10 Calculate the number of bits that can be stored in 1 KB memory.

1.11 Calculate the number of registers in 8 KB memory and the address of the last register in Hex (assuming the address of the first register is 0000).

1.12 Calculate the number of registers in 4 MB memory and the address of the last register in Hex (assuming the address of the first register is 00000).

1.13 If the processor has a 12-bit address bus, calculate its memory addressing capacity.

1.14 If the processor has a 21-bit address bus, calculate its memory addressing capacity.

1.15 If the last memory address in a given memory chip is $07FF_{H}$, calculate the size of the memory chip.

1.16 If the address range of flash memory in a microcontroller is $00000_{H}$ to $1FFFF_{H}$, calculate the size of the memory.

1.17 In a microcontroller, R/W memory is assigned the address range from $2000_{H}$ to $21FF_{H}$. Calculate the size of the R/W memory.

1.18 How are the signed numbers represented in 8-bit MPU?

1.19 Calculate the decimal value of the Hex integer $78_H$ if it is an unsigned number.

1.20 Calculate the decimal values of the Hex integer $98_H$ if it is a signed number as well as if it is an unsigned number.

1.21 Calculate the Hex equivalent to represent a negative decimal number $-12_{10}$ in an 8-bit microprocessor.

1.22 Find the Hex equivalent of the decimal number $138_{10}$ and show its binary representation in an 8-bit processor.

1.23 Find the Hex equivalent of the negative decimal number $-138_{10}$ and show its binary representation in an 8-bit processor.

1.24 Define ASCII code and explain why the total number of codes is limited to 128.

1.25 Find the ASCII codes for upper-case letters A and Z, and lower-case letters a and z from Appendix E.

1.26 Given lower-case ASCII letters, suggest a logical operation to make them uppercase.

1.27 Explain why assembly language programs are efficient in execution.

1.28 What is a major advantage of writing programs in a high-level language?