Chapter 1: Introduction to Microprocessors

1. Define microprocessor. Compare Intel 8085, 8086 and 80386 microprocessors on the basis of their features and internal architectures.
2. What are the basic differences between Harvard and Von Neumann architecture? Elaborate on modified Harvard architecture.
3. What are the basic differences between Microprocessor and Microcontroller?
4. Mention different measures of evolution of microprocessor and briefly discuss the evolution of microprocessor.
5. Draw the block diagram for the internal architecture of Intel 8085 and elaborate each block of it.
6. Elaborate on pin diagram of 8085 microprocessor.
7. Elaborate on the concept of fetch, decode and execution with suitable example.
8. Describe the following PIN of 8085.
   ALE, RST, HOLD, HLDA , and INTA

Chapter 2: Assembly language programming

1. Explain flags in 8085 with the help of a diagram. What is the function of LDAX B?
2. Explain opcode, operand and mnemonics. Elaborate on one, two and three byte instruction with suitable examples.
3. Elaborate on the instruction sets under category, data transfer, with suitable examples.
4. Elaborate on the instruction sets under category, arithmetic, with suitable examples.
5. Elaborate on the instruction sets under category, logical, with suitable examples.
6. Elaborate on the instruction sets under category, branching, with suitable examples.
7. Elaborate on the instruction sets under category, machine control, with suitable examples.
8. What do you mean by addressing modes? Elaborate on different types of addressing modes with suitable examples.
9. Define T-state, machine cycle and instruction cycle. Draw the labelled timing diagram for the instruction, LXI B, C00FH.

10. Draw and explain the timing diagram for the 8085 instruction IN 40H, OUT 40H, STA C000H and MVI B, 32H.
11. Draw and explain the timing diagram of LDA 8050H instruction.
12. Elaborate on opcode fetch, memory read and memory write cycles based on their timing diagrams.

Chapter 3: Bus structure, memory and I/O interfacing

1. What are the major differences between SRAM and DRAM? Also explain their read and write operation.
2. With a suitable diagram explain the read and write operation with a DRAM cell. Also point out the disadvantage of using a DRAM cell.
3. What are the three basic functions microprocessor should satisfy to interface any memory chip? Explain how two 2048x8 EEPROMs are interfaced with 8085 microprocessor. Also, find the address range.
4. Explain how 2 KB ROM and 4KB EPROM are interfaced with 8085 microprocessor.
5. Design an address decoding circuit for 8085 or 8086 Microprocessor to interface 2KB ROM, 4KB ROM and 8KB ROM memory modules starting at address 1000H.
6. Explain how 1KB RAM, 2KB ROM and 4KB EEPROM are interfaced with 8085 microprocessor and also find the address range for each chips.
7. Write a BSR control word subroutine for 8255 to set bits PC1 and PC5 and reset them after 1ms. Assume that a delay subroutine is available and the address of control register is F003h.
8. Draw the block diagram of 8255 PPI and explain the functions of the sub-blocks.
9. Explain control word format of 8255 PPI for I/O mode.
10. Explain different modes of 8255 PPI.
11. Explain the function of SIM and RIM instructions with accumulator bit pattern.
12. How does the programmable interrupt controller (8259) handle a multiple sources of interrupt using a single interrupt pin of the microprocessor? Draw the interfacing block with microprocessor and explain the operation.
13. What are interrupts? Differentiate between I/O mapped I/O and memory mapped I/O.

14. Draw and explain the functional block diagram of 8259A PIC.
15. What do you mean by Interrupt vector table? Explain various interrupts used for 8085 microprocessor.
16. Explain different internal blocks of 8251 PCI.
17. Define DMA. Explain mechanism of DMA with block diagram.
18. HOLD and HLDA pin
19. BISYNC protocol

Chapter 4: 16-bit Microprocessor and programming

1. Write the difference between RISC and CISC
2. Assembler directives
3. Registers of 8086
4. Define addressing mode. Explain the different types of addressing mode for 8086 microprocessor.
5. Define the assembler directive. Explain the various types of directives with examples.
6. Explain the predefined types of interrupt available in 8086 microprocessor.
7. Write an 8086 ALP for MASM in DOS-BIOS mode to display the string “Pokhara University” on screen without using 09H.
8. What is Interrupt vector table (IVT)? Draw the IVT for 8086 microprocessor and explain different types of 8086 interrupts with respect to interrupt vector table.
9. Macros and procedures.
10. Features of Intel 80386.
11. Flags of 8086 microprocessor.
12. Write an 8086 program to find square root of a given number provided that the number is perfect square of two digits.
13. Writ an 8086 ALP for MASM to find square of a given number.
14. Draw the functional block diagram of 8086 microprocessor and compare the functions of its two basic units. Illustrate how its architecture is faster than its predecessors.
15. Write an 8086 ALP to reverse the given string.

16. Define “Assembler Directives”. Discuss the function of following directives: SEGMENT and GLOBAL.
17. Write an 8086 ALP to find the factorial of 08H using DOS BIOS Interrupt.

Chapter 5: Data Communication Basics

1. Differentiate between serial and parallel communication. Explain the RS232C standard for serial communication.
2. Null modem configuration
3. Draw and explain the connections to show how RS-232C is made compatible with TTL logic along with its connections for null modem.
4. Baud rate, Simplex and duplex communication
5. Write an ALP to transmit 8080H serially via 8085 microprocessor.
6. Write an ALP to receive 8 bits of data serially via 8085 microprocessor and store it at location D000H.
7. Synchronous and asynchronous data transmission.

8085 Assembly language programming (ALP) – Questions

1. Write an ALP for 8085 to compute:

$$\sum_{i=1}^{n} \frac{x_i}{2}$$

   Where, Xi are three numbers stored at memory locations A001H, A002H and A003H. Store the result at memory location starting at D000H.

2. Explain the function of the following 8085 program. What will be the output of the program displayed at port 01H when the program is executed if the value of BYTE1 is equal to FFH.

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        MVI A, BYTE1
        ORA A
        JMP OUTPRT
        OUT 01H
        HLT
OUTPRT: CMA
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ADI 01H

OUT 01H

HLT

3. Write an 8085 program for the following type of addition

$$1^2 + 2^2 + 3^2 + \ldots\ldots\ldots + 9^2$$

8. Write a program to take input from 4 switches connected to PC3-PC0 and display the status of the switches to 4 LEDs connected to PC7-PC4 of 8255 PPI.
9. Write a program to arrange 10bytes of data in ascending order. The data is stored in memory as an array starting from C100H.
10. Write an Assembly Language Program (ALP) using 8085 instructions to copy ten bytes of data from memory location COOOH – COO9H to new location DOOOH-DOO9H.
11. Write an ALP using 8085 instruction, to generate a continuous square wave with the period of 250 μs. Assume the clock period is 0.33 μs and use bit D4 to output the square wave. Show the delay calculation also.
12. Write an 8085 assembly language program to convert an 8-bit binary number into its equivalent BCD form.
13. Write an 8085 assembly language program to check whether the content of memory location 2500H is even or odd number. If even display 01H at output port 60H else display 00H at the same port.
14. Write a program to convert binary into its equivalent ASCII.
15. Write a program to compare the two numbers located at memory address 2000h and 3000h. If the numbers are equal load the FFH at reg. D else 00 at same register.
16. Write a program for 8085, to examine the content of memory location 8050H to be even or odd. If the content is even, load FF H else load 00H in memory location 8060H.
17. Write an assembly language program for 8085 to convert the BCD number at memory location 1200H into binary and store the result at memory location 1201H.
18. Write an ALP to count number of 1's in a given byte.
19. Write a program to check the given number is odd or even.
20. Write an 8085 assembly language program to add six bytes of data: 23H 41H, 56H, AFH, C5H and A7H and place the SUM and CARRY in memory location 2500H and 2501H respectively.

21. A railway crossing signal has two flashing lights run by 8085 microprocessor. One light is connected to data bit D7 and the second light is connected to D6. Stating necessary assumptions you make, write an assembly language program to turn each signal light alternately on and off at an interval of 1 second.
22. A sequence of ten unsigned numbers is stored at memory location C0C0H. Develop an ALP to find out the greatest number with comment.
23. Write an 8085 assembly language program to add six bytes of data: 23H 41H, 56H, AFH, C5H and A7H and place the SUM and CARRY in memory location 2500H and 2501H respectively.
24. Write an assembly language program for 8085 to convert the BCD number at memory location 1200H into binary and store the result at memory location 1201H
25. Write a program to convert ASCII into its equivalent Binary.
26. Write an ALP that will blink the LEDs connected at Port 00H in the pattern of 10101010 in alternate fashion.
27. Write an ALP such that among the LEDs connected at Port 00H, only one led will glow at a time. The next led will glow next and then the next in a circular fashion.
28. Two sensors, A and B, are connected to ports 00H and 01H respectively via 8 bit ADCs. Three LEDs are connected at pins D0, D1 and D2 of Port 02H. Write an ALP such that D0 will glow when both sensors give same outputs, D1 will glow when sensor A is generating higher output than sensor B and D2 will glow for vice-verse of case II.
29. A temperature sensor is connected to a microprocessor via 8 bit ADC. A heater and a fan are connected at two of the pins of PORT 00H. Design overall system such that heater will be turned on when the temperature falls, fan will be turned on when temperature rises and both will be turned off when temperature is moderate. Make all necessary assumptions.
30. Multiply and divide two eight bit numbers.
31. Create multiplication table of 9 and store it starting at location D000H.
32. Multiply FFH with FFH and store the value at DOOOH.