GUJARAT TECHNOLOGICAL UNIVERSITY

BE 6 SEMESTER – OLD PAPER – W22 TO S26 – QUESTION BANK

Subject Name & Code: Microprocessor and Interfacing - 3160712

Chapter 1: Introduction to Microprocessor, Components of a Microprocessor: Registers, ALU and control & timing, System bus (data, address and control bus), Microprocessor systems with bus organization

Repeated Questions:

1. Bus Organization and Communication with Memory and I/O:

- **Q.** Detail the process by which a microprocessor communicates with memory and I/O devices, including the significance of bus organization. / Explain bus organization in 8085 Microprocessor. **(SUMMER 2025, 3 Marks; WINTER 2025, 4 Marks)**

Other Important Questions:

1. Components and Definitions (Theory):

- **Q.** Describe the components of a microprocessor and their roles. **(WINTER 2025, 3 Marks)**
- **Q.** Define (1) Microprocessor (2) Program Counter (3) Accumulator. **(SUMMER 2026, 3 Marks)**

2. Differences (Theory):

- **Q.** Differentiate between Microcontroller and Microprocessor. **(SUMMER 2023, 3 Marks)**
- **Q.** Explain the difference between a microprocessor and a microcomputer. **(WINTER 2023, 3 Marks)**

Chapter 2: Microprocessor Architecture and Operations, Memory, I/O devices, Memory and I/O operations

Repeated Questions:

1. Memory-Mapped I/O vs I/O-Mapped I/O:

- **Q.** Differentiate the memory-mapped IO with the IO-mapped IO / Compare the memory-mapped IO with the standard IO-mapped IO. **(SUMMER 2023, 4 Marks; SUMMER 2026, 4 Marks)**

Other Important Questions:

1. Number Representation:

- **Q.** How does the microprocessor differentiate among a positive number, negative number and a bit pattern? **(WINTER 2022, 3 Marks)**

2. Memory and I/O Control Signals:

- **Q.** Explain Read/Write control signals for memory and I/O. **(WINTER 2023, 4 Marks)**

Chapter 3: 8085 Microprocessor Architecture, Address, Data and Control Buses, 8085 Pin Functions, Demultiplexing of Buses, Generation of Control Signals, Instruction Cycle, Machine Cycles, T-States, Memory Interfacing

Repeated Questions:

1. 8085 Architecture and Registers:

- **Q.** Draw the architectural diagram of 8085 microprocessor and list out General Purpose Registers, Special Purpose registers with their functions, and Flags in the flag register with required explanation. / Draw and explain architecture/block diagram of 8085. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks; SUMMER 2023, 7 Marks; SUMMER 2025, 7 Marks OR; WINTER 2025, 7 Marks)**
- **Q.** Explain general purpose registers in 8085 Microprocessor. **(SUMMER 2025, 4 Marks; SUMMER 2026, 4 Marks)**

2. Flag Register:

- **Q.** Explain flag register of 8085 Microprocessor with diagram / What is a flag Register? Enlist and explain various types of flags / Explain various flags used in 8085. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks; WINTER 2023, 3 Marks OR; SUMMER 2025, 7 Marks)**

3. Pin Diagram, ALE and Demultiplexing of Buses:

- **Q.** Draw and explain Pin diagram of 8085 Microprocessor. [Diagram required – refer to the original question paper] **(WINTER 2023, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Define significance of ALE pin with an example or a diagram. **(SUMMER 2023, 4 Marks; WINTER 2023, 4 Marks)**
- **Q.** Explain the process of demultiplexing buses in the 8085 microprocessor / Explain de-multiplexing of AD0–AD7 in 8085 with suitable diagram. [Diagram required – refer to the original question paper] **(SUMMER 2023, 4 Marks OR; SUMMER 2025, 7 Marks; WINTER 2025, 4 Marks)**

4. Memory Interfacing:

- **Q.** Draw the memory interface of 4kB EPROM with starting address 0000H and 2kB RAM with starting address followed by EPROM with 8085 Microprocessor / Draw interfacing of 4KB EPROM and two 2KB static RAMs using 74LS138. [Diagram required – refer to the original question paper] **(SUMMER 2023, 7 Marks OR; SUMMER 2026, 7 Marks OR)**

Other Important Questions:

1. Pin Functions and Control Signals:

- **Q.** List three control signals generated by the 8085 microprocessor and their purposes. **(WINTER 2025, 3 Marks)**
- **Q.** Explain functions of following pins in 8085: (1) TRAP (2) SID (3) HLDA. **(SUMMER 2026, 3 Marks)**
- **Q.** Explain the purpose of the following signals in 8085: 1. READY 2. AD0–AD7 3. HOLD 4. IO/M 5. INTR. **(SUMMER 2023, 4 Marks)**
- **Q.** Explain function of following 8085 pins: (1) READY (2) HLDA (3) X1 & X2. **(SUMMER 2025, 3 Marks)**
- **Q.** Describe the functions of (1) READY PIN (2) ALE (3) HOLD (4) X1 and X2 (5) SID and SOD (6) IO/M (7) HLDA. **(WINTER 2022, 7 Marks)**

2. Instruction Cycle, Machine Cycles and T-States (Theory):

- **Q.** Describe the entire process of executing an instruction by the 8085 microprocessor, including the roles of the ALU, registers, and control unit. **(WINTER 2025, 7 Marks)**

- **Q.** Describe in detail the instruction cycle, including machine cycles and T-states, of the 8085 microprocessor. **(WINTER 2025, 7 Marks OR)**

3. Timing Diagrams:

- **Q.** 2100: MVI A, 55H; ADI 45H — identify the byte size of the ADI 45H command. Illustrate the execution process of ADI 45H by creating a diagram that includes the machine cycles it undergoes. In your diagram, indicate the states of the address bus, data bus, and control signals (*RD, WR, IO/M, ALE) during each T-state. Also, provide the names of the machine cycles involved. [Diagram required – refer to the original question paper] **(WINTER 2025, 7 Marks)**
- **Q.** Explain Memory Write Machine Cycle of 8085 with suitable diagram. [Diagram required – refer to the original question paper] **(SUMMER 2026, 4 Marks)**
- **Q.** Draw timing diagram of instruction MOV A, B. [Diagram required – refer to the original question paper] **(SUMMER 2025, 4 Marks)**
- **Q.** 2100 LXI H, 1234H; MVI A, 55H; ADD M — What is the size of ADD M instruction? Name the machine cycles. Draw machine cycle and T-state diagram and specify the content of address bus, data bus and control signals *RD, WR, IO/M and ALE signals and status signals S1 and S0 for every T state of ADD M instruction only. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks)**
- **Q.** Draw and Explain Timing Diagram of MVI A, 45H. [Diagram required – refer to the original question paper] **(WINTER 2023, 7 Marks)**

4. Memory Address Range (Numerical):

- **Q.** Find the ending address of an 8K-byte memory if the starting address is ‘0’. **(WINTER 2023, 3 Marks)**
- **Q.** What is the ending address of a 2K-bytes memory whose starting address is 3000H? **(WINTER 2023, 3 Marks OR)**

5. Registers (Theory):

- **Q.** Explain General purpose Data register. **(WINTER 2023, 3 Marks)**

Chapter 4: Assembly Language Programming Basics, Classification of Instructions, Addressing Modes, 8085 Instruction Set, Instruction and Data Formats, Writing, Assembling & Executing A Program, Debugging The Programs

Repeated Questions:

1. Addressing Modes:

- **Q.** Explain addressing modes of 8085 microprocessor / Elaborate different addressing modes in 8085 with suitable examples / Discuss various types of addressing modes of 8085. **(WINTER 2022, 3 Marks; SUMMER 2023, 7 Marks OR; WINTER 2025, 3 Marks OR; SUMMER 2026, 7 Marks)**
- **Q.** Explain Indirect addressing mode in 8085 with examples / Explain Indirect and Immediate addressing mode with example. **(WINTER 2023, 4 Marks; SUMMER 2025, 4 Marks)**

2. Instruction Set and Programming Model:

- **Q.** Explain instruction set of 8085 microprocessor / List instruction set of 8085. **(SUMMER 2023, 3 Marks; WINTER 2023, 7 Marks OR - includes list of instruction set and timing diagram of two-byte instructions; WINTER 2025, 4 Marks)**
- **Q.** Explain 8085 Programming model and classify instruction set on the basis of different addressing modes. **(WINTER 2022, 4 Marks; WINTER 2023, 7 Marks)**

3. Assembler, Debugger and Linker:

- **Q.** Explain Assembler, Debugger and Linker with an example. **(WINTER 2023, 3 Marks; SUMMER 2026, 3 Marks)**

Other Important Questions:

1. Addressing Modes, Instruction Size and Machine Cycles:

- **Q.** State the addressing modes and size of the following instructions: MOV B, M; MVI A, 16H; LDA 2050H. **(WINTER 2025, 3 Marks)**
- **Q.** Specify the size, addressing mode, required Machine cycles, T-States and function for following instructions: 1. MOV B, M 2. SHLD 2300H. **(WINTER 2025, 4 Marks OR)**
- **Q.** Specify byte size of each instruction: (1) ADD B (2) MVI A,32H (3) CMA. **(SUMMER 2026, 3 Marks OR)**
- **Q.** State the addressing modes of the following instructions: 1. CMA 2. LDA 2500H 3. ANA M 4. LXI SP. **(SUMMER 2023, 3 Marks)**
- **Q.** Explain register addressing mode in 8085 with examples. **(SUMMER 2025, 4 Marks)**
- **Q.** Specify the addressing mode, required Machine cycles, T-States and function for following instructions: MVI M, 45H; RAL; LHLD 2300H. **(WINTER 2022, 7 Marks)**

2. Instruction Functions and Differences:

- **Q.** Describe any four data transfer instructions in 8085 with examples. **(SUMMER 2026, 4 Marks)**
- **Q.** Describe any four arithmetic instructions in 8085 with examples. **(SUMMER 2026, 4 Marks OR)**
- **Q.** Explain following instructions: (1) RIM (2) SHLD (3) RRC. **(SUMMER 2026, 3 Marks OR)**
- **Q.** Explain function of given instructions: (1) DAD (2) LHLD (3) XCHG. **(SUMMER 2025, 3 Marks)**
- **Q.** Explain function of given instructions: (1) ANI (2) RLC (3) SIM. **(SUMMER 2025, 3 Marks)**
- **Q.** Difference between RLC and RAL instruction. **(WINTER 2022, 3 Marks)**
- **Q.** Difference between RRC and RAR instruction. **(WINTER 2022, 3 Marks)**
- **Q.** If an 8085 is an 8 bit microprocessor, how many bits can be loaded by the 3 register pairs (BC, DE, HL, or SP) using LXI? **(SUMMER 2023, 3 Marks)**
- **Q.** Explain One byte, Two byte, Three byte and write short note on different types of instruction sets. **(WINTER 2022, 4 Marks)**

3. Assembly Language Basics and Simple Programs:

- **Q.** What are the advantages of an assembly language in comparison with high level languages? **(WINTER 2022, 4 Marks)**
- **Q.** Describe how to use the ADI and SUI instructions in an 8085-assembly language program to perform basic arithmetic operations. Provide a short example program that adds 25H to the accumulator and then subtracts 10H from the result. **(WINTER 2025, 4 Marks)**

4. Program Tracing: Flags and Register Contents (Numerical):

- **Q.** What are the states of the Auxiliary Carry (AC), Carry (CY), Sign (S) and Parity (P) flags after executing the following 8085 program? MVI L, 5DH; MVI A, 6BH; ADD L. **(WINTER 2022, 3 Marks)**
- **Q.** What are the states of the Auxiliary Carry (AC), Carry (CY), Sign (S) and Parity (P) flags after executing the following 8085 program? MVI A, A9H; MVI B, 57H; ADD B; ORA A. **(WINTER 2022, 3 Marks)**
- **Q.** What are the contents in Register H and L after executing the following 8085 program? MVI L, 01H; MVI H, 00H; INX H. **(WINTER 2023, 4 Marks)**
- **Q.** What are the states of the Carry (C), Zero (Z) flags and content in Accumulator (A) after executing the following 8085 program? MVI L, 01H; MVI A, 00H; SUB L. **(WINTER 2023, 4 Marks OR)**

Chapter 5: Writing 8085 assembly language programs with decision making and looping using data transfer, arithmetic, logical and branch instructions

Repeated Questions:

1. Finding the Smallest/Smaller Number:

- **Q.** Write an assembly language program to find the smallest/smaller number from two numbers stored at memory locations and store the result in memory. **(WINTER 2023, 7 Marks OR - 2501H=84H, 2502H=99H → 2503H; SUMMER 2025, 7 Marks - locations 1000H, 1001H → 2000H)**

Other Important Questions:

1. Debugging and Error Correction:

- **Q.** Enlist the error in the below assembly language code: MVI B,20H; MVI D,99H; MVI C, D; LDAX 2099H; ADD 01H; STAX 3000H. Provide the solution after doing the correction at your end. **(WINTER 2025, 7 Marks OR)**
- **Q.** LOOP: LXI H, 1234H; DCX H; JNZ LOOP — Find out the mistake(s) in the above program and write the correct program so that it does not become infinite loop. **(WINTER 2022, 4 Marks)**

2. Arithmetic Programs:

- **Q.** Create an assembly language program for the 8085 microprocessor that performs subtraction of two 8-bit numbers. Specify the memory address of each instruction, and include a flowchart for the program. [Diagram required – refer to the original question paper] **(WINTER 2025, 7 Marks)**
- **Q.** Create an assembly language program for the 8085 microprocessor that performs addition of two 8-bit numbers. Specify the memory address of each instruction, and include a flow chart for the program. [Diagram required – refer to the original question paper] **(WINTER 2025, 7 Marks OR)**
- **Q.** How does the instruction sequence MVI A, 07H; RLC; MOV B, A; RLC; RLC; ADD B use the values stored in registers A and B to execute a specific mathematical function in an assembly language program? **(SUMMER 2023, 7 Marks OR)**

3. Comparison Programs:

- **Q.** Write an assembly language program to find the larger number from given two numbers stored at 2501H = 98H, 2502H = 87H; result store at 2503H. **(WINTER 2023, 7 Marks)**

4. Loops, Branching and Sorting:

- **Q.** Illustrate how conditional branch instructions like JNZ (Jump if Not Zero) are used in 8085 assembly language programming. Provide an example program snippet that utilizes JNZ to perform an operation repeatedly until a condition is met. **(WINTER 2025, 4 Marks OR)**
- **Q.** Write an assembly language program in 8085 to arrange five 8-bit numbers in ascending order stored at memory location starting from 1000H. **(SUMMER 2026, 7 Marks OR)**
- **Q.** An array of ten data bytes are stored from memory locations 2100H onwards. Write an 8085 assembly language program to find the minimum number from this array and store it to new memory location 2200H. **(SUMMER 2023, 3 Marks OR)**

5. I/O Control Programs:

- **Q.** Table with electronic items plugged into a single electric board and switches S7–S0 connected to D7–D0. Write assembly language program for given scenarios: Krunal, Chirag, Arkil, Avadh, and day-time use of FAN and PC. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks)**
- **Q.** Write an assembly language program to provide the given ON/OFF time to traffic lights (Red, Green, Yellow) and two pedestrian signs (Walk and Don't Walk). The signal lights are turned ON/OFF by data bits of PORT1; write Delay subroutine to generate appropriate delay. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks OR)**

Chapter 6: Stack & Subroutines, Developing Counters and Time Delay Routines, Code Conversion, BCD Arithmetic and 16-Bit Data operations

Repeated Questions:

1. Time Delay Program (Numerical):

- **Q.** Write an assembly language program to generate a 1 second delay for a given crystal frequency. **(SUMMER 2023, 7 Marks - 2 MHz crystal frequency; SUMMER 2025, 7 Marks - 1 MHz crystal frequency)**

2. CALL and RET Instructions:

- **Q.** Explain the process/working of CALL and RET instructions in 8085 microprocessor with example / Describe the process by which the 8085 processor executes the CALL instruction, and how the timing diagram illustrates this sequence of events. **(SUMMER 2023, 7 Marks; SUMMER 2026, 4 Marks)**

Other Important Questions:

1. Stack and Subroutines (Theory):

- **Q.** Define Stack. Explain importance of Stack in 8085 Microprocessor. **(SUMMER 2026, 3 Marks)**
- **Q.** Define (1) Stack (2) Counter (3) Time Delay. **(SUMMER 2025, 3 Marks)**
- **Q.** Explain subroutine in 8085 Microprocessor with example. **(SUMMER 2025, 4 Marks)**

2. Programs:

- **Q.** Using stack operations, write an 8085 assembly program to set the sign, zero, and parity flags while resetting the auxiliary carry and carry flags. **(SUMMER 2023, 4 Marks)**
- **Q.** Write an assembly language program to add two 16-bit numbers stored in memory with carry in 8085 simulator. Store result in the memory. **(SUMMER 2026, 7 Marks)**

Chapter 7: Interfacing Concepts, Ports, Interfacing Of I/O Devices, Interrupts In 8085, Programmable Interrupt Controller 8259A, Programmable Peripheral Interface 8255A

Repeated Questions:

1. Interrupts in 8085:

- **Q.** Differentiate maskable and non-maskable interrupts in 8085 Microprocessor. **(WINTER 2022, 4 Marks; SUMMER 2025, 3 Marks OR)**
- **Q.** List and explain the interrupts available in microprocessor 8085 / List the Software and Hardware interrupts of 8085. **(SUMMER 2023, 3 Marks OR; WINTER 2025, 3 Marks OR)**

2. Programmable Peripheral Interface 8255A:

- **Q.** Explain various operating modes of 8255A / Discuss the operation of the 8255 Programmable Peripheral Interface and how it is interfaced with an 8085 microprocessor. What are the different modes of operation and how are they selected? **(SUMMER 2023, 4 Marks OR; SUMMER 2026, 7 Marks)**

3. Programmable Interrupt Controller 8259A:

- **Q.** Draw Block Diagram and Pin Diagram of 8259 / Draw and explain architecture of 8259A / Explain Programmable Interrupt Controller 8259A / Explain the internal Block diagram of 8259A. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks; SUMMER 2025, 7 Marks OR; WINTER 2025, 3 Marks; SUMMER 2026, 7 Marks OR)**

Other Important Questions:

1. Interfacing Concepts:

- **Q.** Define the term “interfacing” in the context of microprocessors. **(WINTER 2025, 3 Marks)**
- **Q.** Describe the process of interfacing an I/O device with the 8085 microprocessor. **(WINTER 2025, 4 Marks OR)**

2. Interrupt Management:

- **Q.** Explain how interrupts are managed in the 8085 microprocessor. **(WINTER 2025, 4 Marks)**
- **Q.** What is vectored and non-vectored interrupts? **(WINTER 2022, 4 Marks)**

3. Programmable Peripheral Interface 8255A:

- **Q.** Explain the purpose of the Programmable Peripheral Interface 8255A. **(WINTER 2025, 3 Marks OR)**
- **Q.** Draw and explain input and output handshake mode of 8255A. [Diagram required – refer to the original question paper] **(SUMMER 2025, 7 Marks)**
- **Q.** Explain control register in 8255A with diagram. [Diagram required – refer to the original question paper] **(SUMMER 2025, 4 Marks OR)**
- **Q.** Explain the internal Block diagram of 8255A. [Diagram required – refer to the original question paper] **(WINTER 2022, 7 Marks OR)**

4. Programmable Interrupt Controller 8259A (Program):

- **Q.** Provide an example program in assembly language that initializes a single 8259 Programmable Interrupt Controller (PIC) connected to an 8085 processor. **(SUMMER 2023, 7 Marks)**

Chapter 8: Advanced Microprocessors: 8086 logical block diagram, segmentation, Pin functions, Minimum and maximum mode, 80286/80386: Overview and architecture, Programming model, Data types and instruction set, segments and its types, segment descriptor, descriptor table and selectors

Repeated Questions:

1. 8086 Architecture, Modes and Segment Registers:

- **Q.** Describe the importance of bus interface unit (BIU) and execution unit (EU) in the 8086 microprocessor / Draw and explain BIU and EU in 8086 Microprocessor. **(SUMMER 2023, 4 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Draw and explain logical block diagram / internal architecture of 8086 microprocessor and functions of major components / Draw and explain internal architecture and PIN diagram of 8086 microprocessor. [Diagram required – refer to the original question paper] **(SUMMER 2023, 7 Marks; WINTER 2025, 7 Marks OR)**
- **Q.** Explain operating modes of 8086 Microprocessor in detail / Describe operating modes in 8086 Microprocessor. **(SUMMER 2025, 3 Marks; SUMMER 2026, 4 Marks OR)**
- **Q.** Describe different types of segment registers in 8086 Microprocessor / Explain segment registers in 8086 Microprocessor. **(SUMMER 2025, 4 Marks; SUMMER 2026, 3 Marks)**

2. 80286 and 80386 Microprocessors:

- **Q.** Draw and explain architecture of 80286 Microprocessor / Describe the architecture of the 80286 with a neat block diagram. [Diagram required – refer to the original question paper] **(SUMMER 2023, 7 Marks OR; SUMMER 2025, 7 Marks; SUMMER 2026, 7 Marks OR)**
- **Q.** Provide an overview of the 80286 and 80386 microprocessors, highlighting their architectural advancements compared to the 8086 / Differentiate 8086, 80286 and 80386 / Differentiate 80286 with 80386 microprocessor. **(SUMMER 2023, 3 Marks; WINTER 2025, 7 Marks; SUMMER 2026, 3 Marks OR)**

Other Important Questions:

1. 8086 Microprocessor:

- **Q.** How the physical addresses are calculated from segment register in 8086 microprocessor? **(SUMMER 2023, 4 Marks OR)**
- **Q.** Draw and explain pin diagram of 8086 Microprocessor. [Diagram required – refer to the original question paper] **(SUMMER 2025, 7 Marks OR)**

2. 80286 Microprocessor:

- **Q.** Explain flag register in 80286 Microprocessor. **(SUMMER 2026, 4 Marks)**
- **Q.** Differentiate between the real mode and protected mode of the 80286 microprocessor. **(SUMMER 2023, 3 Marks OR)**
- **Q.** Differentiate GDT and LDT in 80286 Microprocessor. **(SUMMER 2025, 3 Marks OR)**

3. 80386 Microprocessor:

- **Q.** Explain register organization in 80386 Microprocessor. **(SUMMER 2025, 4 Marks OR)**
- **Q.** List features of 80386 microprocessor. **(WINTER 2022, 3 Marks)**

Uncategorised Questions

Repeated Questions:

None identified.

Other Important Questions:

1. Other Architectures and Processors:

- **Q.** Draw block diagram of SUN SPARC architecture. [Diagram required – refer to the original question paper] **(WINTER 2022, 4 Marks - topic not directly listed in the supplied syllabus chapters)**
- **Q.** List features 80486 microprocessor. **(WINTER 2022, 3 Marks OR - not explicitly covered by the supplied Chapter 8 outline, which lists 8086/80286/80386)**
- **Q.** Draw logical block diagram of ARM 7 architecture. [Diagram required – refer to the original question paper] **(WINTER 2022, 4 Marks OR - topic not directly listed in the supplied syllabus chapters)**

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