

MICROPROCESSOR

2 marks questions and answers

Unit I

1. Define microprocessor?

A microprocessor is a multipurpose, programmable, clock-driven, register-based electronic device that reads binary instructions from a storage device called memory accepts binary data as input and processes data according to instructions, and provides result as output.

2. Define microcomputer?

A computer that is designed using a microprocessor as its CPU. It includes microprocessor, memory, and I/O.

3. Define ROM?

A memory that stores binary information permanently. The information can be read from this memory but cannot be altered.

4. What is an ALU?

The group of circuits that provides timing and signals to all operation in the computer and controls data flow.

5. Define small-scale integration?

The process of designing a few circuits on a single chip. The term refers to the technology used to fabricate logic gates on a chip.

6. What is an instruction?

An instruction is a binary pattern entered through an input device in memory to command the microprocessor to perform specific function.

7. What are the four primary operations of a MPU?

1. Memory read
2. Memory write
3. I/O read
4. I/O write

8. What do you mean by address bus?

The address bus is a group of 16 lines generally identified as A_0 to A_{15} . The address bus is unidirectional: bits flow from MPU to peripheral devices.

9. How many memory locations can be addressed by a microprocessor with 14 address lines?

The 8085 MPU with its 14-bit address is capable of addressing $2^{14} = 16,384$ (ie) 16K memory locations.

10. Why is the data bus bi-directional?

The data bus is bi-directional because the data flow in both directions between the MPU and memory and peripheral devices.

11. What is the function of the accumulator?

The accumulator is the register used to store the 8-bit data to perform the arithmetic and logical operations.

12. Define control bus?

This is single line that is generated by the MPU to provide timing of various operations.

14. What is a flag?

The data conditions, after arithmetic or logical operations, are indicated by setting or resetting the flip-flops called flags.

15. Why are the program counter and the stack pointer 16-bit registers?

Memory locations for the program counter and stack pointer have 16-bit addresses. So the PC and SP have 16-bit registers.

16. Define memory word?

The number of bits stored in a register is called a memory word.

17. Specify the number of registers and memory cells required in a 128 x 4 memory chip?

Number of registers = 128

Memory cells required is $128 \times 4 = 512$

18. Explain the function of ALE and IO/M signals in the 8085 architecture?

The ALE signal goes high at the beginning of each machine cycle indicating the availability of the address on the address bus, and the signal is used to latch the low-order address bus. The IO/M signal is a status signal indicating whether the machine cycle is I/O or memory operation. The IO/M signal is combined with the RD and WR control signals to generate IOR, IOW, MEMW, MEMR .

19. If the 8085 adds 87H and 79H, specify the contents of the accumulator and the status of the S, Z, and CY flag?

The sum of 87H and 79H = 100H. Therefore, the accumulator will have 00H, and the flags will be S = 0, Z = 1, CY = 1

20. Write down the control and status signals?

Two Control signals and three status signals

Control signals: RD and WR

Status signals: IO/M, S₁, S₂

21. Define machine cycle?

Machine cycle is defined, as the time required completing one operation of accessing memory, I/O, or acknowledging an external request.

22. Define T-state?

T-state is defined as one subdivision of the operation of performed in one clock period.

23. What is a transparent latch? Why is it necessary to latch with output devices such as LED's?

A transparent latch is a flip-flop; its output changes according to input when the clock signal is high, and it latches the input on the trailing edge of the clock. The latch is necessary for output devices to retain the result; otherwise the result will disappear

24. Give the bit positions reserved for the flags?

D7	D6	D5	D4	D3	D2	D1	D0
S	Z		AC		P		CY

25. Define instruction cycle?

Instruction cycle is defined, as the time required completing the execution of the instruction.

UNIT-II

1. What is an instruction set?

The entire group of instructions, determines what functions the microprocessor can perform is called instruction set.

2. Give the functional categories of 8085 microinstructions?

- Data transfer operations
- Arithmetic operations
- Logical operations
- Branching operations
- Machine control operations

3. Define Opcode and operand?

The operation to be performed is called Opcode. The data to be operated is called operand.

4. Define the types of branching operations?

Jump: to test the conditions

Call, Return, And Restart: Change the sequence of the program

5. Define two-byte instruction with one example?

In a 2-byte instruction, the first byte specifies the Opcode; the second byte specifies the operand.

Example:

Opcode	operand	binary code	hex code
MVI	A, Data	0011 1110	3E
		DATA Data	second byte

6. Write instructions to load the hexadecimal numbers 65H in register C, and 92h in the accumulator A .Display the number 65H at PORT0 and 92H at PORT1?

```
MVI C, 65H
MVI A, 92H
OUT PORT1 ; DISPLAY 92H
MOV A, C ; COPY C INTO A FOR DISPLAY
OUT PORT0 ; DISPLAY 65H
HLT
```

7. What operation can be performed by using the instruction ADD A?

The instruction ADD a will add the content of the accumulator to itself; this is equivalent to multiplying by 2.

8. What operation can be performed by using the instruction SUB A? Specify the status of Z and CY?

The instruction SUB a will clear the accumulator. The flag status will be CY = 0 and Z = 1.

9. Write instructions to a) load 00H to accumulator
 b) Decrement the accumulator
 c) Display the answer

MVI	A, 00H	(A = 0 0 0 0 0 0 0 0
DCR	A	- 0 0 0 0 0 0 0 1
OUT	PORT#	<u>1 1 1 1 1 1 1 1 = FFH)</u>
HLT		

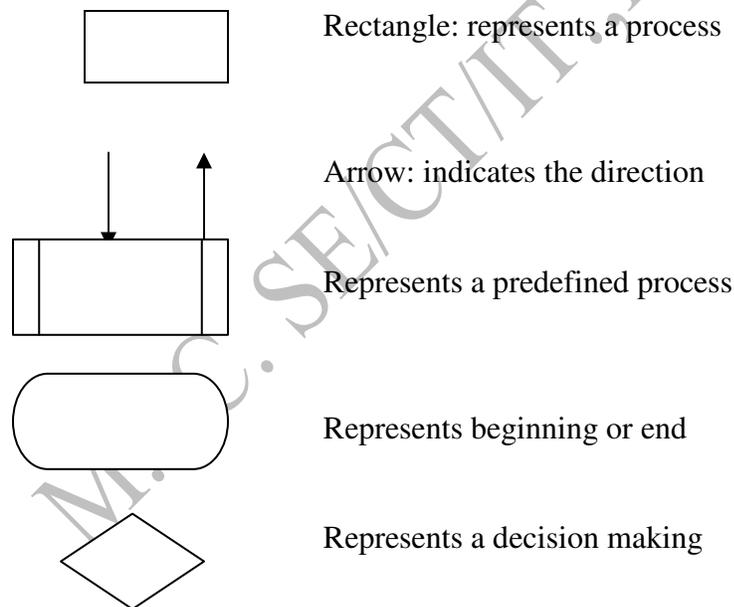
10. What is the machine control operations used in 8085 microprocessor?

HLT: Halt
 NOP: No Operation

11. What is data transfer instructions?

The data transfer instructions copy data from one source in to a destination without modifying the content of the source.

12. Give the flow chart symbols?



13. What are the notations used in the 8085 instructions?

R = 8085 8-bit register
 M=memory register
 Rs = Register source
 Rd = register destination
 Rp = register pair
 () = Contents of

14. How is the instruction set classified?

The instruction set is classified in three groups according to the word size:

- 1-byte instruction
- 2-byte instruction
- 3-byte instruction

15. What is JNC 16-bit address?

It change the program sequence to the location specified by the 16-bit address if the carry flag is reset .

16. Give the instructions that perform the logical operations?

- AND, OR, Exclusive-OR
- Rotate
- Compare
- Complement

17. What is a three-byte instruction?

In a three-byte instruction, the first byte specifies the Opcode, and the following two bytes specifies the 16- bit address.

18. Define a program?

A program is a sequence of instructions written to tell the computer to perform a specific function.

19. Define ASCII code?

ASCII code is a 7-bit code that represents both decimal numbers, alphabets. Extended ASCII is an 8-bit code.

20. What is STA in data transfer instruction?

Copy the data from the accumulator in the memory location specified by the 16-bit address

21. What is an IN instruction?

This is a 2-byte instruction. It accepts data from the input port specified in the second byte.

22. What is an OUT instruction?

This is a 2-byte instruction. It sends the content of the accumulator to the output port specified in the second byte.

23. Give the difference between JZ and JNZ?

JZ change the program sequence to the location specified by the 16-bit address if the zero flag is set

JNZ change the program sequence to the location specified by the 16-bit address if the zero flag is reset.

24. What is CMA?

Complements the data in the accumulator.

25. What is CALL instruction?

CALL instruction change the sequence to the location of a subroutine.

UNIT III

1. Why the number of out ports in the peripheral-mapped I/O is restricted to 256 ports?

The number of output ports in the peripheral I/O is restricted to 256 ports because the operand of the OUT instruction is 8-bits; it can have only 256 combinations

2. If an input and output port can have the same 8-bit address how does the 8085 differentiate between the ports?

In The 8085 differentiates between the input and output ports of the same address by the control signal. The input port requires the RD and the output port requires the WR signal.

3. What are the control signals necessary in the memory mapped I/O?

RD, WR, I/O (low)

4. Why a latch is used for the output port and a tri-state buffer is used for the input port?

A latch is necessary to hold the output data for display. The input data byte is obtained by enabling a tri-state buffer and placed in the accumulator.

5. What happens when the 8085 execute the out instruction?

When the 8085 executes the out instruction, in the third machine cycle, it places the output port address on the low-order address bus, duplicates the same port address on the high-order bus, places the contents of the accumulator on the data bus and asserts the control signal WR.

6. How will the port number be affected if we decode the high-order address lines $A_{15} - A_8$ rather than $A_7 - A_0$?

The port address will remain the same because the I/O port address is duplicated on both segments of the address bus.

7. Define Memory mapped I/O?

Instead of a memory register, if an output device is connected at the address, the accumulator contents will be transferred to the output device. This is called memory mapped I/O.

8. What is an interrupt I/O?

The interrupt I/O is a process of data transfer whereby an external device or a peripheral can inform the processor that it is ready for communication and it requests attention

9. What is Partial Decoding?

The output port can be selected by decoding some of the address lines is called partial decoding

10. Define absolute decoding?

All the eight lines are decoded to generate one unique output pulse. This is called absolute decoding.

11. Give the characteristics of Memory mapped I/O?

- Execution speed
- Data transfer
- Device address

12. What is SIM?

SIM: Set interrupt Mask. It is a 1-byte instruction. Used for three functions

- a. To set the Mask
- b. To reset the flip flop
- c. Implement the I/O

13. What is RIM?

RIM: Read Interrupt Mask. Used for three functions

- a. To read interrupt mask
- b. To identify the pending interrupt
- c. To receive serial data

14. What are the two categories of an interrupt?

Four Maskable interrupt
One Non Maskable interrupt

15. What is the purpose of an interrupt enable?

The instruction Enable Interrupt sets the Interrupt Enable flip-flop and enables the interrupt process

16. Write an instruction to enable all the interrupts in an 8085 system?

EI
MVI A,08H
SIM

17. Give the commonly used priority modes?

Fully Nested mode
Automatic rotation mode
Specific rotation mode

18. What do you mean by control logic?

This has two pins. INT as an output, and INTA as an input. The INT is connected to the interrupt pin of the MPU.

19. What are the two modes of DMA execution?

Slave Mode, Master mode

20. How the 8327 DMA controller transfers 64K bytes of data per channel with address lines?

The most significant bits D15 and D14 of the count register are used to specify DMA function and the remaining fourteen bits are used to specify the number of bytes to be transferred.

21. Give the three formats of END of Interrupt?

- NON-specific EOI command
- Specific EOI command
- Automatic interrupt

22. What are the signals used by the DMA controller?

The Signals are:

- HLDA
- DMA request
- DMA acknowledge
- AEN – address enable
- ADSTB- address strobe

23. Give the additional features of 8259A controller?

- Input triggering
- Interrupt Status
- Poll Method

24. How the signals of the 8237 are classified?

The signals are classified in to two groups.

- i. One group of signals are used for interfacing with the MPU
- ii. Second group for communicating with the peripherals.

25. How long the INTR pulse stays high?

The INTR pulse can remain high until the interrupt flip-flop is set by the EI instruction in the service routine.

UNIT IV

1. What is the purpose for the 8255 PPI?

The 8255A is a widely used, programmable, parallel I/O device. It can be programmed to transfer data under various conditions, from simple I/O to interrupt I/O.

2. List the operating modes of 8255A PPI?

- ◆ Two 8-bit ports (A and B)
- ◆ Two 4-bit ports (C_u and C_L)
- ◆ Data bus buffer
- ◆ Control logic

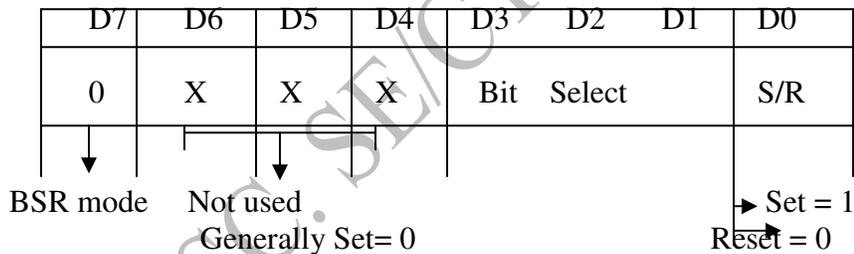
3. Specify the bit of a control word for the 8255, which differentiates between the I/O mode and the BSR mode?

BSR mode $D7=0$, and I/O mode $D5=1$

4. Write the input/output feature in Mode 0 for the 8255A PPI?

- Outputs are latched
- Inputs are not latched
- Ports do not have handshake or interrupt capability

5. Write the control word format in the BSR mode?



6. Write down the output control signals used in 8255A PPI?

- ◆ OBF → output Buffer Full
- ◆ ACK → Acknowledge
- ◆ INTR → Interrupt request
- ◆ INTE → Interrupt Enable

7. What is the use of mode 2 in 8255A PPI?

This mode is used primarily in applications such as data transfer between two computers or floppy disk controller interface.

8. List the major components of 8279 keyboard /display interface?

- ♦ Keyboard section
- ♦ Scan section
- ♦ Display section
- ♦ MPU interface

9. What is the purpose for scan section in Keyboard interface?

The scan section has a scan counter and four scan lines. These scan lines can be decoded using a 4-to-16 decoder to generate 16 lines for scanning.

10. What is USART?

USART is an integrated circuit. It is a programmable device; its function and specifications for serial I/O can be determined by writing instructions in its internal registers.

11. Define parallel-to-serial conversion?

In serial transmission, an 8-bit parallel word should be converted into a stream of eight serial bits. This is known as parallel-to-serial conversion.

12. Define serial-to-parallel conversion?

In serial reception, the MPU receives a stream of eight bits and it is converted into an 8-bit parallel word. This is known as serial-to-parallel conversion.

13. Define simplex transmission?

In simplex transmission, data are transmitted in only one direction.
Example: transmission from a microcomputer to a printer

14. Define Baud?

The rate at which the bits are transmitted is called Baud.

15. Write an instruction for serial output data?

```
MVI  A, 80H; Set D7 in the accumulator = 1
RAR  ; Set D6 = 1
SIM
```

16. List the major components of 8251A programmable communication interface?

- ♦ Read/Write control logic
- ♦ Three buffer registers
- ♦ Data register
- ♦ Control register transmission receiver
- ♦ Data bus buffer
- ♦ Modem control

17. Write the steps necessary to initialize a counter in write operations?

- ♦ Write a control word into the control register
- ♦ Load the low-order address byte
- ♦ Load the high order byte

18. Give the various modes of 8254 timer?

- Mode 0: interrupt or terminal count
- Mode 1: Rate generator
- Mode 3:square wave generator
- Mode 4: software triggered strobe
- Mode 5:hardware triggered strobe

19. What is read back command in 8254 timer?

The Read- Back Command in 8254 allows the user to read the count and the status of the counter.

20. What is transmitter section in USART?

The transmitter section accepts parallel data from the MPU and converts them in to serial data. It has two registers. A buffer register and an output register

M.SC. SE/CT/IT., NICE

UNIT V

1. Define A/D and D/A converters?

D/A converters transform a digital signal to an equivalent analog signal, and A/D converters transform an analog signal to an equivalent digital signal.

2. What is resolution?

Resolution of a converter determines the degree of accuracy in conversion. It is equal to $1/2^n$.

3. To interface an A/D converter with the microprocessor, what does the microprocessor do?

The microprocessor should:

- Send a pulse to the start pin
- Wait until the end of the conversion
- Read the digital signal at the input port

4. Write instructions for the EXEC module, assuming the memory address where execution begins is in register DE?

EXEC: PUSH

RET

5. What are the functions of a single-board microcomputer?

- Check the keyboard for data or functions
- Display memory address, data, and results.
- Execute programs

6. What are the primary objectives of the 16-bit microprocessors

- ♦ increase memory addressing
- ♦ increase execution speed
- ♦ provide a powerful instruction set

7. What is BHE?

BHE is Bus High enable. This is an active low signal used only in the 8086 microprocessor to enable the high order byte of 16-bit data.

8. How many flags are included in the 8086 programming model?

Six data flags and three control flags.

9. Write down the additional flags included in the 8086?

OF → overflow

DF → Direction Flag

IF → Interrupt flag

TF → Trap flag

10. Write the advanced design features of Pentium processor?

- ♦ Superscaler architecture
- ♦ On-chip cache memory for code and data
- ♦ Branch prediction

- ◆ Performance monitoring

11. When a key closure is found, the microprocessor waits for 10 to 20 ms before it accepts an input? Write a delay routine for the above?

```

DBONCE: PUSH B
        PUSH PSW
        LXI B,COUNT
        DCX B
        MOV A,C
        ORA B
        JNZ LOOP
        POP PSW
        POP BC
        RET

```

12. Write a subroutine for KYCHK?

```

KYCHK:  IN PORTA
        CPI 0FFH
        JNZ KYCHK
        CALL DEBONCE

```

13. Write a subroutine for KYPUSH?

```

KYPUSH:          IN PORTA
                CPI 0FFH
                JZ KYPUSH
                CALL DEBONCE
                CMA
                ORA A
                JZ KYPUSH
                RET

```

14. Write the data transfer from Master MPU to Slave MPU?

- The master mpu reads the status
- The master writes the data into port A
- The slave checks the OBF signal
- The slave MPU reads the data from port A

15. Give the status word format for the bi-directional data transfer?

D7	D6	D5	D4	D3	D2	D1	D0
OBF _A	INTE ₁	IBF _A	INTE ₂	INTR _A	X	X	X

Long Answers

UNIT I

1. Explain the architecture of 8085 microprocessor?

Logic pin out of 8085 microprocessor

Address bus: unidirectional bus, used as high order bus

Data bus: bi-directional bus, used as low order address bus and data bus

Control and status signals: two control signals, RD and WR

Three status signals: I/O, S1, and S2

Power supply and clock frequency: The signals are V_{cc} , V_{ss} , X_1 , X_2 , and CLK

Externally initiated signals, including frequency: five signals INTA, RESET, HOLD, READY, INTR

Serial I/o ports: two signals, SID, SOD

2. Explain the Internal architecture of the 8085 microprocessor?

Block Diagram

ALU: performs computing functions. Includes accumulator, temporary register, five flags

The five flags are: sign flag

Zero flag

Auxiliary carry flag

Parity flag

Carry flag

Timing and control unit: communication between microprocessor and peripherals

Instruction register and decoder: decodes the instruction

Register array: used to hold the 8-bit data

3. Describe the 8085 microcomputer with an example?

- Machine cycles and Bus Timings
Communication functions are divided in to three categories:
 1. memory read / write
 2. I/O read and write
 3. Request Acknowledge
- Opcode fetch machine cycle
- Memory read machine cycle
 - Calculated as
 - Clock frequency
 - T-state
 - Execution time for Opcode fetch
 - Execution time for Memory read
 - Execution time for Instruction

4. Describe the concepts of memory interfacing?

Memory structure and its requirements

- R/W memory: 2048 registers, 11 address lines, one chip select, Two control lines
- EPR0M: 4096 registers, 12 address lines
- Diagram

Concepts of memory interfacing

- ♦ Primary function is to read and write in to a given register and write in to a given register.
- ♦ Timing diagram for reading in to a register
- ♦ Timing diagram for writing in to a register

Address decoding and memory address

- ♦ Identify the result of the given register
- ♦ Two methods
- ♦ One using NAND gate
- ♦ Other using 3- to- 8 Decoder
- ♦ Diagram

UNIT II

1. Explain the instruction Classification?

- ♦ Define the instruction set
- ♦ Classification of the instruction
 - **Data transfer operation**: a group of instruction copies from one location to another location
 - **Arithmetic operation**: Addition, subtraction, Inc/dec
 - **Logical operations**: to perform logical operations
 - AND, Or, Exclusive-OR
 - Rotate
 - Compare
 - ♦ **Branching Operations**: alters the sequence of the program
 - Jump, Call, Return

2. Describe the concept of Instructions and data format?

Instruction size

Classified in to three groups

- 1-byte instruction: Opcode and operand in the same byte
- 2-byte instruction: first byte specifies the Opcode and second byte specifies the operand
- 3-byte instruction: first byte specifies the Opcode 2, 3, byte specifies the 16- bit address

Opcode format:

- ❖ All operations, registers have specific code .
Code : 000 001 010 011 100 101 111 110
registers :B C D E H L A memory
- ❖ Examples

Data Format

Data formats used are

- ◆ ASCII code
- ◆ BCD code
- ◆ Signed integer
- ◆ unsigned integer

3. Write an assembly language program to add two 16-bit numbers?

Problem statement

Program to perform addition of 16 bit numbers

Program analysis

Load the number in one register

Load the other no in another register

Increment

add

Program

```
MVI D,88h
MVI C, 82H
INR C
MOV A,C
ADD D
OUT PORT1
HLT
```

Program Description

Program Output

4. Explain the 8085 instruction set?

Data transfer instruction

- ◆ MOV Rd,Rs
- ◆ MVI R,8 BIT
- ◆ IN 8-BIT
- ◆ LXI Rp, 16-BIT
- ◆ STAX Rp

Arithmetic instruction

- ◆ ADD R
- ◆ ADI 8-BIT
- ◆ SUB R
- ◆ SUI 8-BIT
- ◆ INX Rp
- ◆ DCX Rp
- ◆ SUB M
- ◆ INR M
- ◆ DCR M
- ◆ ADD M

Logical instruction

- ◆ ANA R/M
- ◆ ANI 8-BIT
- ◆ ORI 8-BIT
- ◆ XAI 8-BIT
- ◆ CMA
- ◆ RLC
- ◆ RAL
- ◆ RRC

Branch instruction

- ◆ JMP 16-BIT ADDRESS
- ◆ JZ
- ◆ JNZ
- ◆ JC
- ◆ JNC
- ◆ CALL
- ◆ RET

Machine control instruction

- ◆ HLT
- ◆ NOP

5. Write an assembly language program to subtract a BCD number from another BCD number?

Problem statement

Program to perform BCD subtraction

Program analysis

Program

```
MVI A,99H
MVI B, 82H
MVI C, 48H
SUB C
INR A
ADD B
DAA
OUT PORT1
HLT
```

Program Description

Program Output

UNIT III

1. Describe the 8085 Interrupts?

- Describing the interrupt process in eight steps
- RST instructions
 - Contains 8 RST instructions
 - Built with the help of resistors and tri state Buffer
 - When the processor encounters the Restart instruction in the subroutine, the program returns the address that was stored on the stack.
- Implementation of 8085 interrupt
 - Problem Statement
 - Main program T-state
 - Description
- Multiple interrupt

2. Illustrate the Data Input from the DIP switches?

Description of the hardware

- Use tri state octal buffer,
- 3- to-8-decoder

Interfacing Circuit

A7	A6	A5	A4	A3	A2	A1	A0	
1	0	0	0	0	1	0	0	= 84H

Multiple port address

- ♦ the address lines A3 and A4 may be 0 or 1

Instructions to read input Port

To read the instructions from the input port, the instruction IN 84H is used. When the instruction is executed, during the M3 cycle, the 8085 places the address 84H on the low-order bus

3. Explain the concept of memory mapped I/O?

- The input and output devices are identified by 16-bit address
- Uses memory related instructions and control signals
- Instead of a memory register, if an output device is connected at the address, the accumulator contents will be transferred to the output device. This is called memory mapped I/O

Execution of memory related data transfer instructions

- ♦ Decode the address bus to generate the device address pulse
- ♦ AND the control signal
- ♦ Use the device select pulse to enable the I/O

Output port and its address

Input port and its address

Instructions are

**READ: LDA FFF9H
CMA
STA FFF8H
JMP READ**

4. Explain the concept of interrupt Controller with 8259A ?

Block Diagram

Read /Write Logic

Control Logic: two pins: INT, INTA

Interrupt register and priority resolver: has eight request lines

Cascade Buffer/Comparator: used to expand number of interrupt levels

Interrupt operation

The sequence of events occur are

- The IRR stores the requests
- priority register checks the three registers
- The MPU acknowledges the interrupt
- The program sequence is transferred to the memory location

Priority Modes

- ♦ Specific rotation mode
- ♦ Automatic rotation mode
- ♦ Fully Nested mode

End of interrupt

- ♦ NON specific EOI command
- ♦ Specific EOI command

Programming the 8259A

DI
MVI A, 76H
OUT 80H
MVI 20H
OUT 81H

5. Describe the DMA controller

- ♦ Direct memory Access is an I/O technique commonly used for high speed data transfer
- ♦ introduces two signal:HOLD, HLDA

8237 DMA controller

- DMA channels and interfacing

- DMA signals
 - ◆ DREQ0-DREQ3
 - ◆ DACK0-DACK3
 - ◆ AEN, ADSTB
 - ◆ HRQ, HLDA
- Diagram
- System interface

Programming the 8237

- ◆ Write the control word in the mode register
- ◆ Write a control word in the command register that specifies the parameters
- ◆ Write the starting address
- ◆ Write the count in the channel count

UNIT IV

1. Explain the 8255 Programmable peripheral interface?

Block Diagram of 8255A

- Control Logic
- Control word

Mode 0: Simple input/output

- Outputs are latched
- Inputs are not latched
- Ports do not have handshake or interrupt capability

BSR mode

- ◆ BSR control word
- ◆ Port address
- ◆ Subroutine

Mode 1: Input/output with hand shake

Mode 2: Bidirectional data transfer

2. Explain the concept of 8251 USART?

USART is an integrated circuit. It is a programmable device ;its function and specifications for serial I/O can be determined by writing instructions in its internal registers

Read/write control logic and registers

- Chip select
- Control/data
- Write
- Read
- RESET
- CLK

Transmitter Section

- TxD
- TxC
- TxRDY
- TxE

Receiver Section

- Rxd
- RxC
- RxRDY

Block Diagram And initializing the 8251A

3. Explain 8279 keyboard display controller

Block Diagram of the 8279

Keyboard Section

- ♦ Eight lines
- ♦ The keys are automatically debounced
- ♦ Also includes 8 x 8 FIFO

Scan Section

- ♦ Scan counter
- ♦ Four scan lines

Display section

- ♦ Has eight output lines
- ♦ Display can be blanked by using BD line

MPU interface section

- ♦ 8 bidirectional data lines
 - 1 interrupt request line
 - six lines for interfacing

Programming the 8279

- ◆ Circuit description
- ◆ Decoding logic and port addresses
- ◆ Initializations instructions

UNIT V

1. Describe how to interface an 8-bit D/A converter with the 8085?

D/A Converter Circuits

- Diagram
- Requires three elements
- R/2R ladder network

Interfacing the 8-bit D/A converter

- Shareware description
- Program
- Operating the D/A converter

2. Explain bi-directional data transfer between two microcomputers

Problem statement

Design an interfacing circuit to set up the bi-directional data communication in the master slave format between two microcomputers.

Problem Analysis

Data transfer from master to slave

- The master mpu reads the status
- The master writes the data into port A
- The slave checks the OBF signal
- The slave MPU reads the data from port A

Data transfer from slave to master

- The slave checks the hand shake signal
- The slave MPU places data on the data bus
- The master checks the OBF signal
- The master MPU reads the data from port A

Hardware signal

Program

3. Illustrate: Interfacing Keyboard and Seven-Segment Display?

Problem Statement:

Write a program to monitor the keyboard sense a key is pressed and display the number of the key at the seven-segment display

Problem Analysis:

Programming can be divided into four categories

1. Check if a key is pressed
2. Debounce a key
3. Identify and encode the key
4. Obtain the seven-segment code and display it

Keyboard: subroutines for KYCHK and KYCODE

Key DEBOUNCE: Write a delay routine

DBONCE: PUSH B

PUSH PSW

LXI B,COUNT

DCX B

MOV A,C

ORA B

JNZ LOOP

POP PSW

POP BC

RET

Main Program

M.SC. SE/CT/IT.,NICE