MICROPROCESSOR
2 marks questions and answers

UNIT-I

1. Define microprocessors?

A semiconductor device(integrated circuit) manufactured by using the LSI technique. It includes the ALU, register arrays, and control circuits on a single chip.

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 circuit that provides timing and signals to all operation in the computer and controls data flow.

5. What is Micro controller?

A device that includes microprocessor, memory, and I/O signal lines on a single chip, fabricated using VSLI technology.

6. What is an Assembler?

A computer program that translate an assembly language program from mnemonics to the binary machine code of a computer.

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?

A group of lines that are used to send a memory address or a device address from the MPU to the memory location or a peripheral. The 8085 microprocessor has 16 address lines.

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.

13. What is a flag?

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

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

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

15. Define memory word?

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

16. 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 x 4=512

17. Explain the function of ALU and IO/M signals in the 8085 architecture?

The ALU 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.

18. 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.

19. 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

20. Define machine cycle?

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

21. Define T-state?

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

22. 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 return the result; otherwise the result will disappear.

23. Give the bit positions reserved for the flags?

D7   D6   D5   D4   D3   D2   D1   D0

A	Z		AC		P		CY
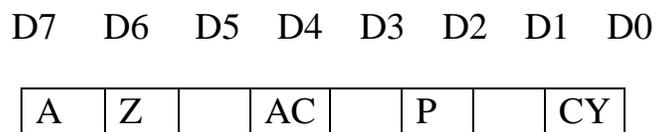
24. Define instruction cycle?

   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 micro instructions?

o Data transfer operations
o Arithmetic operations
o Logical operations
o Branching operations
o 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
MVI A, Data

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# 1 1 1 1 1 1 1 1 = FFH)
HLT

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

HLT: Halt
NOP: No Operation

10. 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.

11. Give the flow chart symbols?

Rectangle: represents a process
Arrow: indicates the direction
Represents a predefined process
Represents beginning or end
Represents a decision making

12. 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

13. 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 .

14. Give the instructions that perform the logical operations?

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

15. 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.

16. Define a program?

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

17. Define ASCII code?

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

18. What is STA in data transfer instruction?

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

19. What is an IN instruction?

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

20. 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.

21. 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.

22. What is CMA?

 Complements the data in the accumulator.

23. What is CALL instruction?

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

24. 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

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 higher order address 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 A15 –A8 rather than A7 – A0?

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.

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

Execution speed
Data transfer
Device address

11. 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

12.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

13. What the two categories of an interrupt?

Four Maskable interrupt
One Non Maskable interrupt

14. What is the purpose of an interrupt enable?

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

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

EI
MVI A,08H   .
SIM

16. Give the commonly used priority modes?

Fully Nested mode
Automatic rotation mode
Specific rotation mode

17. 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.

18. 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 addresslines?

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.

19. Give the three formats of END of Interrupt?

NON-specific EOI command
Specific EOI command
Automatic interrupt

20. What are the signals used by the DMA controller?
The Signals are:

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

21. Give the additional features of 8259A controller?

Input triggering
Interrupt Status
Poll Method

22. 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.

23. 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 of 8255 PPI?

The 8255A is 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?
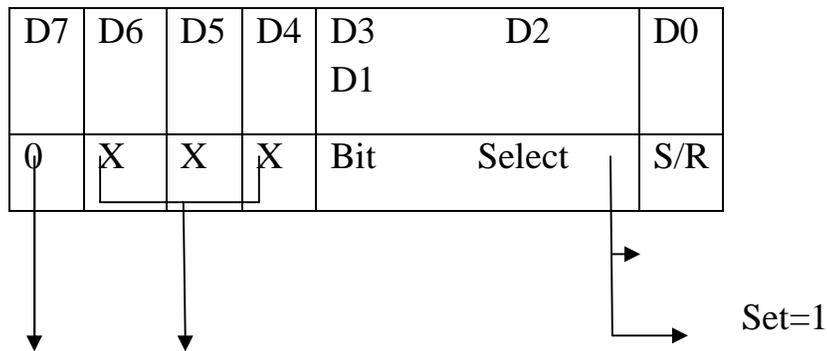
BSR mode D7=0, and I/O mode D5=1

4. Write the input /output feature in Mode 9 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?

D7	D6	D5	D4	D3 D1	D2	D0
0	X	X	X	Bit	Select	S/R

Set=1

Reset=0

BSR mode   Not used

Generally Set=0

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

- OBF ⟶   Output Buffer Full

- ACK ⟶   Acknowledgement

- INTR ⟶   Interrupt request

- INTE ⟶   Interrupt Enable

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

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

8. List the major components of 8257 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 in to a stream of eight serial bits. This is known as parallel to serial conversion.

12. Define simplex transmission?

   In simplex transmission, data are transmitted in only one direction.

   Example: transmission from a microcomputer to a printer.

13. Define Baud?

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

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

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

15. Write the steps necessary to initialize a counter in write operation?

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

16. 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

17. 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.

18. What is transmitter section in USART?

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

19. Write an instruction for serial output data?

MVI   A, 80H   : Set D7 in the accumulator=1

RAR   ; Set D6 =1

SIM

20. Define serial to parallel conversion?

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

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 conversation
- Read the digital signal at the input port

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

EXEC: PUSH

        RET

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

- Increase memory addressing
- Increase execution speed
- Provide a powerful instruction set

6. 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.

7. How many flags are included in 8086 programming model?

Six data flags and three control flags.

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

- ➢ OF----- Overflow
- ➢ DF-----Direction Flag
- ➢ IF------Interrupt Flag
- ➢ TF-----Trap Flag

9. Write the advanced design features of Pentium processor?

- ➢ Superscalar architecture
- ➢ On-chip cache memory for code and data
- ➢ Branch prediction
- ➢ Performance monitoring

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

     JNZ KYCHK

     CALL DEBONCE

13. Write a subroutine for KYPUSH?

KYPUSH: IN PORTA

      CPI OFFH

     JNZ KYPUSH

     CALL DEBONCE

      CMA

      ORA

     JNZ 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