

Academic Year 2024 - 2025

Question Bank

Year/Semester: II/ IV	Department :EEE Subject Code/Title : EE3404 &Microprocessor and Microcontroller Faculty Name: Mrs.A.Bhuvaneswari,AP/EEE	Unit : I/II/III/IV/V Section : Part A/B/C
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UNIT I - INTRODUCTION TO 8085 ARCHITECTURE

Part A

1. What is microprocessor?

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

2. What is Accumulator?

The Accumulator is an 8-bit register that is part of the arithmetic/logic unit (ALU). This register is used to store 8-bit data and to perform arithmetic and logical operations. The result of an operation is stored in the accumulator. The accumulator is also identified as register A.

3. What is stack? (EE2354April/May2013)

The stack is a group of memory locations in the R/W memory that is used for temporary storage of binary information during the execution of a program

4. What is a subroutine program?

A subroutine is a group of instructions written separately from the main program to perform a function that occurs repeatedly in the main program. Thus subroutines avoid the repetition of same set of instructions in the main program.

5. Define addressing mode.

Addressing mode is used to specify the way in which the address of the operand is specified within the instruction.

6. What are the functions of an accumulator?

The accumulator is the register associated with the ALU operations and sometimes I/O operations. It is an integral part of ALU. It holds one of data to be processed by ALU. It also temporarily stores the result of the operation performed by the ALU.

7. List the allowed register pairs of 8085.

B-C register pair ,D-E register pair, H-L register pair

8. Mention the purpose of SID and SOD lines

SID (Serial input data line): It is an input line through which the microprocessor accepts serial data. SOD (Serial output data line): It is an output line through which the microprocessor sends output serial data.

9. What is the function of IO/M signal in the 8085?

It is a status signal. It is used to differentiate between memory locations and I/O operations. When this signal is low (IO/M = 0) it denotes the memory related operations. When this signal is high (IO/M = 1) it denotes an I/O operation.

10. List out the five categories of the 8085 instructions. Give examples of the instructions for each group.

- Data transfer group – MOV, MVI, LXI.
- Arithmetic group – ADD, SUB, INR.
- Logical group – ANA, XRA, CMP.
- Branch group – JMP, JNZ, CALL.
- Stack I/O and Machine control group – PUSH, POP, IN, HLT.

11. Explain priority interrupts of 8085.

The 8085 microprocessor has five interrupt inputs. They are TRAP, RST 7.5, RST 6.5, RST 5.5, and INTR. These interrupts have a fixed priority of interrupt service. If two or more interrupts go high at the same time, the 8085 will service them on priority basis. The TRAP has the highest priority followed by RST 7.5, RST 6.5, RST 5.5. The priority of interrupts in 8085 is shown in the table.

12. What is the signal classification of 8085

All the signals of 8085 can be classified into 6 groups

- Address bus
- Data bus
- Control and status signals
- Power supply and frequency signals
- Externally initiated signals
- Serial I/O ports

13. Define instruction cycle, machine cycle and T-state

Instruction cycle is defined, as the time required completing the execution of an instruction. Machine cycle is defined as the time required completing one operation of accessing memory, I/O or acknowledging an external request. T- cycle is defined as one subdivision of the operation performed in one clock period

14. What is the use of ALE

The ALE is used to latch the lower order address so that it can be available in T2 and T3 and used for identifying the memory address. During T1 the ALE goes high, the latch is transparent ie, the output changes according to the input data, so the output of the latch is the lower order address. When ALE goes low the lower order address is latched until the next ALE.

15. Explain the signals HOLD, READY and SID

HOLD indicates that a peripheral such as DMA controller is requesting the use of address bus, data bus and control bus. READY is used to delay the microprocessor read or write cycles until a slow responding peripheral is ready to send or accept data. SID is used to accept serial data bit by bit

16. Explain the different instruction formats with examples

The instruction set is grouped into the following formats

- One byte instruction MOV C,A
- Two byte instruction MVI A,39H
- Three byte instruction JMP 2345H

17. What is the use of bi-directional buffers?

It is used to increase the driving capacity of the data bus. The data bus of a microcomputer system is bi- directional, so it requires a buffer that allows the data to flow in both directions.

18. Define Flags.

The flags are used to reflect the data conditions in the accumulator.

The 8085 flags are SSign flag, Z-Zero flag, AC-Auxiliary carry flag, P-Parity flag, CYCarry flag

D7	D6	D5	D4D3	D2	D1	D0
S	Z		AC		P	CY

UNIT II - 8085 INSTRUCTION SET AND PROGRAMMING

PART-A

1. What is assembly language? What are machine language and assembly language programs?

The language in which the mnemonics (short -hand form of instructions) are used to write a program is called assembly language. The manufacturers of microprocessor give the mnemonics. The software developed using 1's and 0's are called machine language, programs. The software developed using mnemonics are called assembly language programs.

2. Define machine cycle and T-State

Machine cycle is defined as the time required to complete one operation of accessing memory, I/O, or acknowledging an external request. This cycle may consist of three to six T-states. T-State is defined as one subdivision of the operation performed in one clock period. These subdivisions are internal states synchronized with the system clock, and each T-State is precisely equal to one clock period.

3. Define opcode and operand.

Opcode (Operation code) is the part of an instruction / directive that identifies a specific operation. Operand is a part of an instruction / directive that represents a value on which the instruction acts.

4. What is an ALE?

The ALE (Address Latch Enable) is a signal used to demultiplex the address and data lines, using an external latch. It is used to enable the external latch.

5. Explain the function of IO/M in 8085.

The IO/M is used to differentiate memory access and I/O access. For IN and OUT instruction it is high. For memory reference instructions it is low.

6. Where is the READY signal used?

READY is an input signal to the processor, used by the memory or I/O devices to get extra time for data transfer or to introduce wait states in the bus cycles.

7. What is HOLD and HLDA and how it is used?

Hold and hold acknowledge signals are used for the Direct Memory Access (DMA) type of data transfer. The DMA controller place a high on HOLD pin in order to take control of the system bus. The HOLD request is acknowledged by the 8085 by driving all its tristated pins to high impedance state and asserting HLDA signal high.

8. Define stack

Stack is a sequence of RAM memory locations defined by the programmer.

9. What is program counter? How is it useful in program execution?

The program counter keeps track of program execution. To execute a program the starting address of the program is loaded in program counter. The PC sends out an address to fetch a byte of instruction from memory and increments its content automatically.

10. List the control and status signals available in 8085.

ALE , RD, WR, IO/M, S1, S2

ALE-Address Latch Enable

RD – Read Control Signal ,

WR – Write Control Signal

IO/M - To specify I/O or memory operation
S1, S2 – Status signals

11. What are the various addressing modes in 8085

The 8085 has the following five different types of addressing

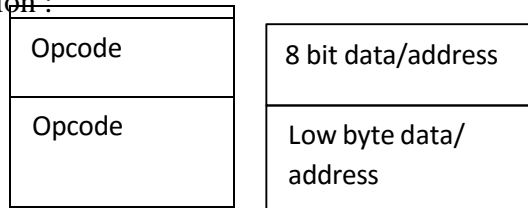
1. Immediate addressing
2. Direct addressing
3. Register addressing
4. Register indirect addressing
5. Implied addressing

12. What are the various instruction format.

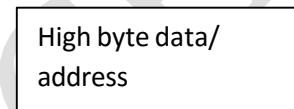
The sizes of 8085 instruction is 1 to 3 bytes. Each instruction has one byte opcode.

The remaining bytes are either data or address. The format of 8085 instructions are shown below. One byte instruction:

Two byte instruction:



Three byte instruction:



13. Give the significance of SIM and RIM instructions in 8085.

SIM- This is a multipurpose instruction and used to implement the 8085 interrupts (RST 7.5, 6.5, and 5.5) and serial data outputs. The instructions interprets the accumulator content.

RIM- It is used to check whether an interrupt is masked or not. It is also used to read data from the SID line.

14. What is an instruction?

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

15. How many operations are there in the instruction set of 8085 microprocessor?

There are 74 operations in the 8085 microprocessor

16. List out the five categories of the 8085 instructions. give ex of the instructions for each group?

1. Data transfer group – MOV,MVI,LXI
2. Arithmetic group – ADD,SUB,INR.
3. Logical group- ANA,XRA,CMP.
4. Branch group – JMP,JNZ,CALL.
5. Stack I/O and machine control group – PUSH,POP,IN,HLT.

17. Explain the difference between a JMP instruction and CALL instruction.

A JMP instruction permanently changes the program counter.

A CALL instruction leaves information on the stack so that the original program execution sequence can be resumed.

18. Explain the purpose of the I/O instructions IN and OUT

The IN instruction is used to move data from an I/O port in to the accumulator. The OUT instruction is used to move data from the accumulator to an I/O port.

The IN and OUT instructions are used only on microprocessor, which use a separate address

space for interfacing.

19. What is the difference between the shift and rotate instructions?

A rotate instruction is a closed loop instruction, that is, the data moved out at one end is put back in at the other end. The shift instruction loses the data that is moved out of the last bit locations.

20. List the four instructions which control the interrupt structure of the 8085 microprocessor?

- DI (disable interrupts)
- EI (enable interrupts)
- RIM (read interrupt masks)
- SIM (set interrupt asks)

21. Mention the categories of instruction and give two ex for each category?

The instructions of 8085 can be categorized in to the following five

1. Data transfer MOV RD,RS,STA 16-BIT
2. Arithmetic ADD R,DCR M.
3. Logical XRI 8-bit, RAR Branching JNZ CALL 16-bit
4. Machine control HLT,NOP
- 5.

22. Explain LDA,STA AND DAA instructions

LDA copies the data byte in to the accumulator from the memory location specified by the 16-bit address. STA copies the data byte from the accumulator in the memory location specified by 16-bit address. DAA changes the content of the accumulator from binary to 4-bit BCD digits.

23. How does the microprocessor differentiate b/w data and instruction?

When the first m/c code of an instruction is fetched and decoded in the instruction register, the microprocessor recognizes the number of bytes required to fetch the entire instruction. For ex MVI A, data, the second byte is always considered as data. If the data byte is omitted by mistake whatever is in that memory location will be considered as data and the byte after the "data" will be treated as the next instruction.

24. What are subroutine?

Procedures are group of instructions stored as a separate program in memory and it is called from the main program in memory and it is called from the main program whenever required. The type of procedure depends on where the procedures are stored in memory. If it is in the same code segment as that of the main program then it is a near procedure otherwise it is a far procedure.

25. What is a recursive procedures?

A recursive procedure is a procedure, which calls itself. Recursive procedures are used to work with complex data structures called trees. If the procedure is called with $N=3$, then the N is decremented by 1 after each procedure CALL and the procedure is called until $N=0$.

26. How to access subroutine with in the main program procedure?

- i) accessed by CALL & RET instruction
- ii) machine code of instruction is put only once in the memory
- iii) with procedures less memory is required
- iv) parameters can be passed in registers, memory location or stack

UNIT III - INTERFACING BASICS AND ICS

PART-A

1. What is Polling?

Polling is a scheme or an algorithm to identify the devices interrupting the processor. Polling is employed when multiple devices interrupt the processor through one interrupt pin of the processor.

2. What are the different types of Polling?

The polling can be classified into software and hardware polling. In software polling the entire polling process is governed by a program. In hardware polling, the hardware takes care of checking the status of interrupting devices and allowing one by one to the processor.

3. What is the need for interrupt controller?

The interrupt controller is employed to expand the interrupt inputs. It can handle the interrupt request from various devices and allow one by one to the processor.

4. List some of the features of INTEL 8259 (Programmable Interrupt Controller)

1. It manages eight interrupt requests.
2. The interrupt vector addresses are programmable.
3. The priorities of interrupts are programmable.
4. The interrupt can be masked or unmasked individually.

5. What is a programmable peripheral device ?

If the functions performed by a peripheral device can be altered or changed by a program instruction then the peripheral device is called a programmable device. Usually the programmable devices will have control registers. The device can be programmed by sending a control word in the prescribed format to the control register.

6. What is synchronous data transfer scheme?

For a synchronous data transfer scheme, the processor does not check the readiness of the device after a command has been issued for read/write operation. In this scheme the processor will request the device to get ready and then read/write to the device immediately after the request. In some synchronous schemes a small delay is allowed after the request.

7. What is asynchronous data transfer scheme?

In an asynchronous data transfer scheme, first the processor sends a request to the device for read/write operation. Then the processor keeps on polling the status of the device. Once the device is ready, the processor executes a data transfer instruction to complete the process.

8. Explain the working of a handshake output port

In a handshake output operation, the processor will load data to the port. When the port receives the data, it will inform the output device to collect the data. Once the output device accepts the data, the port will inform the processor that it is empty. Now the processor can load another data to the port and the above process is repeated.

9. What are the internal devices of 8255 ?

The internal devices of 8255 are port-A, port-B and port-C. The ports can be programmed for either input

or output function in different operating modes.

10. What is baud rate?

The baud rate is the rate at which the serial data are transmitted. Baud rate is defined as $1/(The\ time\ for\ a\ bit\ cell)$. In some systems one bit cell has one data bit, then the baud rate and bits/sec are same.

11. What is USART?

The device which can be programmed to perform Synchronous or Asynchronous serial communication is called USART (Universal Synchronous Asynchronous Receiver Transmitter). The INTEL 8251A is an example of USART.

12. What are the functions performed by INTEL 8251A?

The INTEL 8251A is used for converting parallel data to serial or vice versa. The data transmission or reception can be either synchronously or asynchronously. The 8251A can be used to interface MODEM and establish serial communication through MODEM over telephone lines.

13. What are the control words of 8251A and what are its functions ?

The control words of 8251A are Mode word and Command word. The mode word informs 8251 about the baud rate, character length, parity and stop bits. The command word can be send to enable the data transmission and reception.

14. What are the information that can be obtained from the status word of 8251 ?

The status word can be read by the CPU to check the readiness of the transmitter or receiver and to check the character synchronization in synchronous reception. It also provides information regarding various errors in the data received. The various error conditions that can be checked from the status word are parity error, overrun error and framing error.

15. Give some examples of input devices to microprocessor-based system.

The input devices used in the microprocessor-based system are Keyboards, DIP switches, ADC, Floppy disc, etc.

16. What are the tasks involved in keyboard interface?

The task involved in keyboard interfacing are sensing a key actuation, Debouncing the key and Generating key codes (Decoding the key). These task are performed software if the keyboard is interfaced through ports and they are performed by hardware if the keyboard is interfaced through 8279.

17. How a keyboard matrix is formed in keyboard interface using 8279?

The return lines, RL0 to RL7 of 8279 are used to form the columns of keyboard matrix. In decoded scan the scan lines SL0 to SL3 of 8279 are used to form the rows of keyboard matrix. In encoded scan mode, the output lines of external decoder are used as rows of keyboard matrix.

18. What is scanning in keyboard and what is scan time?

The process of sending a zero to each row of a keyboard matrix and reading the columns for key actuation is called scanning. The scan time is the time taken by the processor to scan all the rows one by one starting from first row and coming back to the first row again.

19. What is scanning in display and what is the scan time?

In display devices, the process of sending display codes to 7 segment LEDs to display the LEDs one by one is called scanning (or multiplexed display). The scan time is the time taken to display all the 7-segment LEDs one by one, starting from first LED and coming back to the first LED again.

20. What are the internal devices of a typical DAC?

The internal devices of a DAC are R/2R resistive network, an internal latch and current to voltage converting amplifier.

21. How the microprocessor is synchronized with peripherals?

The timing and control unit synchronizes all the microprocessor operations with clock and generates control signals necessary for communication between the microprocessor and peripherals.

22. What are the steps required to get data from keyboard?

- i) Detect a key press
- ii) Debounce the key press
- iii) Encode it

23. What is synchronous data transfer?

It is a data method which is used when the I/O device and the microprocessor match in speed. The transfer of data to or from the device, the user program issues a suitable instruction addressing the device. The data transfer is completed at the end of the execution of this instruction.

24. What is asynchronous data transfer?

It is a data transfer method which is used when the speed of I/O device does not match with the speed of the microprocessor. Asynchronous data transfer is also called as Handshaking.

25. What are the functional types used in control words of 8251A?

The control words of 8251A are divided into two functional

types 1 Mode Instruction control word

2. Command Instruction control word

Mode Instruction control word: - This defines the general operational characteristics of 8251A.

Command Instruction control word: - The command instruction controls the actual operations of the selected format like enable transmit/receiver, error reset and modem control.

26. What are the basic modes of operation of 8255?

There are two basic modes of operation of 8255, viz.

- 1. I/O mode.
- 2. BSR mode

In I/O mode, the 8255 ports work as programmable I/O ports, while in BSR mode only port C (PC0-PC7) can be used to set or reset its individual port bits. Under the IO mode of operation, further there are three modes of operation of 8255, So as to support different types of applications, viz. mode 0, mode 1, and mode 2.

Mode 0- Basic I/O

Mode 1- Strobe I/O mode

Mode 2- Strobe bi-direction I/O

27. What is meant by keyboard debouncing?

Key bouncing may cause multiple entries made for the same key. To overcome this problem after a key press is sensed the device is made to wait for few milliseconds. Then the key is checked again to ensure it is still pressed. If it is still pressed it is taken as a valid key press. This process is called keyboard debouncing

UNIT IV - INTRODUCTION TO 8051 MICROCONTROLLER

PART-A

1. What is meant by microcontroller

A device which contains the microprocessor with integrated peripherals like memory, serial ports, parallel ports, timer/counter, interrupt controller, data acquisition interfaces like ADC, DAC is called microcontroller.

2. List the features of 8051 microcontrollers?

The features are

- *Single Supply +5 volt operation using HMOS technology.
- *4096 bytes program memory on chip (not on 8031)
- *128 data memory on chip.
- *Four register banks.
- *Two multiple mode, 16-bit timer/counter.
- *Extensive Boolean processing capabilities.
- *64 KB external RAM size
- *32 bidirectional individually addressable I/O lines.
- *8 bit CPU optimized for control applications.

3. Explain the operating mode0 of 8051 serial ports?

In this mode serial enters & exits through RXD, TXD outputs the shift clock. 8 bits are transmitted/received: 8 data bits (LSB first). The baud rate is fixed at 1/12 the oscillator frequency.

4 . Explain the operating mode2 of 8051 serial ports?

In this mode 11 bits are transmitted (through TXD) or received (through RXD): a start bit(0), 8 data bits(LSB first), a programmable 9th data bit, & a stop bit(1). On transmit the 9th data bit (TB* in SCON) can be assigned the value of 0 or 1. Or for eg.; the parity bit(P, in the PSW) could be moved into TB8. On receive the 9th data bit goes into the RB8 in Special Function Register SCON, while the stop bit is ignored. The baud rate is programmable to either 1/32 or 1/64 the oscillator frequency.

5. Explain the mode3 of 8051 serial ports?

In this mode, 11 bits are transmitted (through TXD) or received (through RXD): a start bit(0), 8 data bits(LSB first), a programmable 9th data bit, & a stop bit(1). In fact, Mode3 is the same as Mode2 in all respects except the baud rate. The baud rate in Mode3 is variable. In all the four modes, transmission is initiated by any instruction that uses SBUF as a destination register. Reception is initiated in Mode0 by the condition RI=0 & REN=1. Reception is initiated in other modes by the incoming start bit if REN=1.

6. Explain DJNZ instruction of Intel 8051 microcontroller?

- a) DJNZ Rn, rel Decrement the content of the register Rn and jump if not zero.
- b) DJNZ direct, rel Decrement the content of direct 8-bit address and jump if not zero.

7. State the function of RS1 and RS0 bits in the flag register of Intel 8051 microcontroller?

RS1, RS0- Register bank select
bits RS1, RS0- Bank
Bank 0, Bank 1, Bank 2, Bank 3

8. Give the alternate functions for the port pins of port3?

RD WR T1 T0

INT 1 INT 0 TXD RXD

RD – Read data control output

WR – Write data control output

T1 – Timer / counter 1 external input or test pin T0 – Timer / counter 0 external input or test pin

INT 1 – Interrupt 1 input pin

INT 0 – interrupt 0 input pin

TXD – Transmit data pin for serial port in UART

mode RXD – Receive data pin for serial port in

UART mode

9. Explain the function of the pins PSEN and EA of 8051.

PSEN: PSEN stands for program store enable. In 8051 based system in which an external ROM holds the program code, this pin is connected to the OE pin of the ROM.

EA: EA stands for external access. When the EA pin is connected to Vcc, program fetched to address 0000H through 0FFFH are directed to the internal ROM and program fetches to addresses 1000H through FFFFH are directed to external ROM/EPROM. When the EA pin is grounded, all addresses fetched by program are directed to the external ROM/EPROM.

10. Explain the 16-bit registers DPTR and SP of 8051.

DPTR stands for data pointer. DPTR consists of a high byte (DPH) and a low byte (DPL). Its function is to hold a 16-bit address. It may be manipulated as a 16-bit data registers. It serves as a base register in indirect jumps, lookup table instructions and external data transfer.

SP stands for stack pointer. SP is a 8-bit wide register. It is incremented before data is stored during PUSH and CALL instructions. The stack array can reside anywhere in-chip RAM. The stack pointer is initialised to 07H after a reset. This causes the stack to begin at location. 08H.

11. Name the special functions registers available in 8051.

Accumulator

B Register

Program status Word.

Stack pointer.

Data pointer

Port 0 Port 1 Port 2 Port

3 Interrupt priority control register

Interrupt enable control register.

12. Explain the register IE format of 8051.

EA ET2 ES

ET1 EX1 ET0 EX0

EA- Enable all control bit.

ET2- Timer 2 interrupt enable bit. ES- Enable serial port control bit. ET1- Enable Timer1 control bit.

EX1-Enable external interrupt1 control

bit. ET0-Enable Timer0 control bit.

EX0-Enable external interrupt0 control bit.

13. Name the five interrupt sources of 8051?

The interrupt are: Vector address

External interrupt 0: IE0: 0003H Timers

interrupt 0: TF0: 000BH External interrupt 1:

IE1: 0013H Timers interrupt 1: TF1:001BH

Serial interrupt

Receive interrupt: RI: 0023H Transmit

interrupt: TI: 0023H

14. List the addressing modes of 8051?

Direct addressing

Register

addressing

Register indirect addressing

Implicit addressing Immediate

addressing Index addressing

Bit addressing

15.Explain the interrupts of 8051 microcontroller?

The interrupts are:

Vector address

- External interrupt 0 : IE0 : 0003H
- Timer interrupt 0 : TF0 : 000BH
- External interrupt 1 : IE1 : 0013H
- Timer Interrupt 1 : TF1 : 001BH

Serial Interrupt

- Receive interrupt : RI : 0023H
- Transmit interrupt: TI : 0023H

UNIT V - INTRODUCTION TO RISC-BASED ARCHITECTURE
PART A

1. What is CCP Module?

The CCP (Capture/Compare/PWM) module contains a 16 bit register that can operate as a 16 bit capture register as a 16 bit compare register or as a PWM duty cycle register.

2. What is difference between CCP and ECCP module?

CCP and ECCP modules are differentiated by their PWM features. **The standard CCP module provides a single PWM output, while the ECCP module can drive up to four PWM outputs.** The enhanced PWM features make the ECCP module suitable for a variety of power and motor control applications

3. What is CAN module?

The Controller Area Network (CAN) module is **a serial interface useful for communicating with other peripherals or microcontroller devices.** This interface/protocol was designed to allow communications within noisy environments.

4. What is MSSP module?

The Master Synchronous Serial Port (MSSP) module is the **enhanced Synchronous Serial Port developed by Microchip Technology** and is featured on many of the PICmicro devices. This module provides for both the 4-mode SPI communications, as well as Master and Slave I2C communications, in hardware.

5. What USART module?

A USART (universal synchronous/asynchronous receiver/transmitter) is **hardware that enables a device to communicate using serial protocols**. It can function in a slower asynchronous mode, like a universal asynchronous receiver/transmitter (UART), or in a faster synchronous mode with a clock signal.

6. What is W register?

The W register is a special register in the PIC architecture, that is used as one of the 2 operands for ALU operations, and can also be the destination for any ALU operation. In PIC18 devices, the W register is also mapped in RAM and can be accessed through the WREG special function register.

7. What is file register in PIC18?

File register 00 (INDF) is **used for indirect file register addressing**. The address of the register required is placed in the file select register (FSR). When data is written to or read from INDF, it is actually written to or read from the file register pointed to by FSR.

8. What is access bank?

The PIC18 MCU provides register **direct, immediate, inherent, indirect, and bit-direct** addressing modes for specifying instruction operands.

9. List the addressing mode supported by PIC 18 microcontroller.

Direct, Immediate, Inherent, Indirect, and Bit-Direct

10. List the I/O ports supported by PIC 18f458.

Port A has 7 pins; (RA0-RA6)

Ports B, C, and D each have 8 pins; (RB0-RB7)(RC0-RC7)(RD0-RD7) Port E has only 3 pins.(RE0-RE2).

11. List the SFRs associated with each port in PIC 18.

- TRIS Register (Data Direction Register)
- PORT Register (reads the levels on the pins of the device)
- LAT Register (Output latch)
-

12. State the timers available in PIC18F458.

PIC18F458 has four timers. The timers 0, 1, and 3 are 16-bit timers while timer 2 is 8-bit timer. These can be used as timer, counters or for PWM generators.

Timer	Size	Control Register	Count Registers
TIMER0	8-bit /16 bit	T0CON	TMR0H,TMR0L
TIMER1	16-bit	T1CON	TMR1H,TMR1L
TIMER2	8-bit	T2CON	TMR2
TIMER3	16-bit	T3CON	TMR3H,TMR3L

13. State the Sources of interrupts in PIC18.

- PIC18F4550 has three external hardware interrupts - **INT0, INT1, and INT2.**
- Timer Interrupts : TMR0IF, TMR1IF, TMR2IF and TMRIF
- Serial Communication Interrupts: TXIF and RCIF
- RB Port Change Interrupts: RBIF
- A/D Converter Interrupts : ADIF
- Compare ,Capture, PWM,Interrupt:CCP1IF
-

14. Compare polling and interrupt.

The 8051 microcontroller can do only one task at a time. In polling, the microcontroller continuously checks each port one by one according to the priority assigned to the ports, and if any device requires service, then it provides it. In interrupt, when the device requires service, it sends the request to microcontroller and the controller then provides service to it.

So essentially, the difference is that in polling, microcontroller has to check continuously whether any device is asking for request, while in interrupt the device itself sends the request and the controller satisfies it. And because microcontroller is freed from the task of checking each port, it can do other work.

15. What are timer registers?

Timer registers are two 16-bit registers and can be accessed as their lower and upper bytes. TLO represents the lower byte of the timing register 0, while TH0 represents higher bytes of the timing register

0. Similarly, TLI and THI represent lower and higher bytes of timing register 1. These registers can be accessed using the addresses allotted to them, which lie in the special function registers address range, i.e.,

PART-B

UNIT I

1. Describe the functional pin diagram of 8085.
2. Draw & explain the architecture of 8085 microprocessor
3. Explain the 8085 interrupt system in detail.
4. Explain various machine cycles supported by 8085.
5. (i) With suitable examples explain how I/O devices are connected using memory mapped I/O and peripheral I/O.
(ii) Design a microprocessor system to interface an $8K \times 8$ EPROM and $8K \times 8$ RAM.
6. Draw timing diagrams for the following instruction with appropriate control and status signal. Explain in brief. CALL 2000
7. (i) Interface a $8K \times 8$ EPROM IC and $2K \times 8$ RAM IC with 8085 such that the starting address assigned to them are 0000H and 4000H respectively using address decoder having NAND gate and inverters
(ii) Draw the timing diagram of I/O read cycle in 8085 and explain it
8. Draw and explain the timing diagram of the following instructions of 8085 Microprocessor.
(i) LDA 2050H
(ii) RET
9. With necessary diagrams, write short notes on the following
(i) RAM memory interfacing
(ii) ROM memory interfacing
10. Explain
(i) Interrupt structure of 8085
(ii) Distinguish peripheral mapped I/O and memory mapped I/O technique
11. (i) Write short notes on vectored interrupts of 8085.
(ii) Draw the microprocessor Bus timing for the instruction STA 4500h and Explain.

UNIT II

1. Explain the addressing modes of 8085 with example.
2. Explain the Different types of instruction in 8085.
3. Write a program to arrange n numbers in ascending order.
4. Explain the BCD to Decimal code conversion technique and write 8085 assembly language program for the same.
5. Explain the BCD to Seven Segment code conversion technique and write 8085 assembly language program for the same.
6. i) Write a program to calculate the factorial of a number between 0 to 8.
ii) Write a program to find the number of negative, zero and positive numbers.
7. Explain the operations carried out when 8085 executes the instructions
(i) MOV A, M
(ii) XCHG
(iii) DAD H
(iv) DAA
(v) POP PSW
9. Write 8085 Assembly language program to perform the following $ab + ac$, where a, b and c are 8 bit binary numbers. Explain with algorithm and flowchart.

(i) Write 8085 ALP to perform 16 bit addition of 2 numbers from location 4100h and 4102h using 16 bit move and arithmetic instructions and save the result from the next memory location.

(ii) With suitable example explain the various addressing modes used in the instruction set of 8085 microprocessor.

10. (i) Explain the operation of stack in 8085 microprocessor

(ii) Explain the sequence of events in the execution of CALL and RET instructions. Explain the instruction classification & instruction sets

11. Draw the timing diagram of the following

Instructions

PUSH

IN Port A STA 5000

MVI A, 08

UNIT III

1. Explain any one of the modes of 8255 in detail.

2. With neat block diagram explain PPI.

3. i) Using model, write a program to communicate between two microprocessors using 8255.

ii) Show the control word format of 8255 and explain how each bit is programmed.

4. With neat block diagram explain the functions of 8259.

5. i) Bring about the features of 8251.

ii) Discuss how 8251 is used for serial communication of data.

iii) Explain the advantages of using the USART chips in microprocessor based systems.

6. Design an interface circuit needed to connect DIP switch as an input device and display the value of the key pressed using a 7 segment LED display. Using 8085 system, write a program to implement the same.

7. Explain the 7 segment LED interface with microprocessor.

8. i) Explain the advantages of using the keyboard and display controller chips in microprocessor based system.

9. i) Explain the working of 8254 timer and write a program using it to generate a square waveform

ii) Describe with any one of the mode configurations of 8254 timer in detail

10. Explain how to convert an analog signal into digital signal.

11. Interface an 8-bit DAC with 8085 microprocessor using 8255 and write assembly language programs to generate square wave of 1 KHZ and triangular wave of 100 Hz. The crystal frequency connected to 8085 is 6 MHz.

12. With necessary diagrams explain the interfacing of Analog to Digital converter with microprocessor 8085.
13. Discuss various operating modes of 8253 timer with necessary control words (16)
14. With neat sketch explain the functions of 8251.
15. With neat sketch explain the functions of 8255 PPI.
16. With neat sketch explain the function of DMA controller
17. With neat sketch explain the function of Programmable Interrupt Controller.
18. With neat sketch explain the function of Keyboard and display controller.

UNIT IV

1. Describe the architecture of 8051 with neat diagram.
2. i) Discuss the peripheral interface of 8051.
ii) Explain the interrupt structure of 8051 microcontroller Explain how interrupts are prioritized.
3. i) What is the difference between the Microprocessors and Microcontrollers?
ii) Explain the I/O port structure of 8051.
4. i) Explain the different serial communication modes in 8051.
ii) Explain the memory structure of 8051.
5. States various modes available for timer in 8051.
6. Explain the functional pin diagram of 8051 Microcontroller.
7. (i) Explain the different addressing modes in 8051 in detail
(ii) Describe the different modes of operation of timers in 8051.
8. Explain the Timer/Counter functional unit of Microcontroller 8051 with relevant diagrams.
9. Explain the different serial communication modes in 8051.

UNIT V

1. Draw and explain the interrupt in structure of PIC18?
2. Write a note on enabling and disabling interrupts.
4. State the steps to enable interrupts in PIC18.
5. Draw and explain the bit pattern for INTCON register.
6. Draw and explain the bit pattern for INTCON2 register.
7. Draw and explain the bit pattern for INTCON3 register.
8. Draw and explain the bit pattern for PIR1 register.
9. Draw and explain the bit pattern for PIR2 register.
10. Write a short note on interrupt priority in PIC18.
11. Explain the programming of PIC18 timer using interrupts with the help of an example.
12. List the steps for Programming PIC18 external interrupts.
Explain the programming of PIC18 external interrupts with the help of an example

