



QUESTION BANK

Name of the Department : Electrical and Electronics Engineering
Subject Code & Name : EE 8551 & MICROPROCESSORS AND MICROCONTROLLERS
Year & Semester : III & V

UNIT I 8085 PROCESSOR

PART-A

1. What is Microprocessor? Give the power supply & clock frequency of 8085.

The microprocessor is a programmable device that takes in numbers, performs on them arithmetic or logical operations according to the program stored in memory and then produces other numbers as a result. It has 40 pins and uses +5V for power. It can run at a maximum frequency of 3 MHz.

2. State the use of RESET IN and RESET OUT pins of 8085 processor.

RESET IN (Input)

Reset sets the Program Counter to zero and resets the Interrupt Enable and HLDA flipflops. None of the other flags or registers (except the instruction register) are affected. The CPU is held in the reset condition as long as Reset is applied.

RESET OUT (Output)

Indicates CPU is being reset. Can be used as a system RESET. The signal is synchronized to the processor clock.

3. Mention the purpose of SID and SOD lines.

SID (Input)

Serial input data line. The data on this line is loaded into accumulator bit 7 whenever a RIM instruction is executed.

SOD (Output)

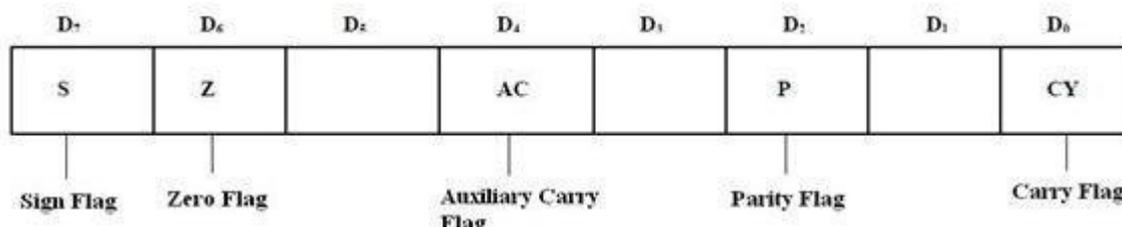
Serial output data line. The output SOD is set or reset as specified by the SIM instruction.

4. What are the functions of an accumulator?

The accumulator is an 8-bit register that is a part of 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.

5. What are the flags in 8085?

8 bit register –shows the status of the microprocessor before/after an operation—S (sign flag), Z (zero flag), AC (auxiliary carry flag), P (parity flag) & CY (carry flag)



6. Specify the size of data, address, memory word and memory capacity of 8085 microprocessor.



S.No	Components of 8085	Size
1	Data	8-bit
2	Address	16-bit
3	Memory word	8-bit
4	Memory capacity	64 KB

7. List the five interrupt pins available in 8085

- TRAP
- RST7.5
- RST6.5
- RST5.5
- INTR
- INTA is not an interrupt.

There are 6 interrupt pins in the microprocessor used as Hardware Interrupts given below: INTA is used by the Microprocessor for sending the acknowledgement. TRAP has highest priority and RST7.5 has second highest priority and so on.

8. What is ALE ?

ALE is a control signal of 8085 MPU. 8085 is a 8-bit microprocessor which have 16-bit address bus among them lower 8-bit are multiplexed. So while MPU executes read or write operation it needs to demultiplexed. ALE control signal used to de multiplexed the lower order address and data bus.

9. To obtain a 320 ns clock, what should be the input clock frequency? What is the frequency of clock signal at CLK OUT ?

Given : $T = 320 \text{ ns}$. We know that $f = 1/T$

$$f = 1/320 * 10^{-9} = 10^9/320$$

$$= 3.125 \text{ MHz}$$

The input clock frequency = $2 * 3.125 \text{ MHz} = 6.25 \text{ MHz}$ The frequency of clock signal at CLK OUT = 3.125 MHz

10. What is meant by level triggered interrupt? Which of the interrupts in 8085 are level triggered?

An **interrupt** is a signal to the processor emitted by hardware or software indicating an event that needs immediate attention.

A level-triggered interrupt is an interrupt signaled by maintaining the interrupt line at a high or low level. A device wishing to signal a Level-triggered interrupt drives the interrupt request line to its active level (high or low), and then holds it at that level until it is serviced.

TRAP interrupt is edge and level triggered. The RST 6.5 and RST 5.5 both are level triggered. INTR also a level sensitive interrupt.

11. Why data bus is bi-directional?

The microprocessor has to fetch (read) the data from memory or input device for processing and after processing, it has to store (write) the data to memory or output device. Hence the data bus is bi-directional.



12. What is multiplexing and what is its advantage?

Multiplexing is transferring different information at different well defined times through same lines. A group of such lines is called multiplexed bus. The advantage of multiplexing is that fewer pins are required for microprocessors to communicate with outside world. The 16 bit address and data lines of 8085 are demultiplexed using an external 8-bit D-Latch (74LS373) and the ALE signal of 8085.

13. List the various machine cycles of 8085

The various machine cycles of 8085 are

- i (i) Opcode fetch cycle
- ii (ii) Memory read cycle
- iii (iii) Memory write cycle
- iv (iv) I/O read cycle
- v (v) I/O write cycle
- vi (vi) Interrupt acknowledge cycle
- vii (vii) Bus idle cycle.

14. What is T -state?

The T-state is the time period of the internal clock signal of the processor. The time taken by the processor to execute the machine cycle is expressed in T-state.

15. What is Tri state logic?

Logic outputs have two normal status low and high corresponding to values 0 and 1. However some outputs have a third electrical state that is not logic state at all, called high impedance (or) floating state. In this state the output behaves as if it is not even connected to the circuit, except for a small leakage current that may flow into (or) out of the output pin. The circuit having such three states is called Tri-state logic.

16. What is TRAP interrupt and its significance?

The TRAP is non maskable interrupt of 8085. It is not disabled by processor reset after recognition of interrupt. TRAP has the highest priority. TRAP is edge & level triggered. It is unaffected by any mask (or) interrupt enable.

17. What is function of program counter in 8085?

This 16-bit register deals with sequencing the execution of instructions. This register is a memory pointer. Memory locations have 16-bit addresses, and that is why this is a 16-bit register. The function of the program counter is to point to the memory address from which the next byte is to be fetched. When a byte (machine code) is being fetched, the program counter is incremented by one to point to the next memory location.

18. List the control and status signals in 8085 microprocessor and mention its need.

ALE --- Address Latch Enable (Demultiplexing address and data line) READY --- To provide extra time to data signals. **1. Address bus 2. Data bus**
RD' and WR' --- Read and Write operation status signals. IO/M' --- Input output operation or Memory operation. S0, S1 --- Indicate the type of machine cycle in progress.

19. What is meant by wait state?

This state is used by slow peripheral devices. The peripheral devices can transfer the data to or from the microprocessor by using READY input line. The microprocessor remains in the wait state as



long as READY line is low. During the wait state, the contents of the address, address/data and control buses are held constant.

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20. Steps involved to fetch a byte in 8085?

- i) The pc places the 16-bit memory address on the address bus
- ii) The control unit sends the control signal RD to enable the memory chip
- iii) The byte from the memory location is placed on the data bus
- iv) The byte is placed in the instruction decoder of the microprocessor and the task is carried out according to the instruction.

21. A microprocessor takes $n \mu s$ is for executing an instruction. What design change will make the microprocessor to execute the same instruction in $n/2 \mu s$?

By replacing the crystal of double frequency than that of existing one we can execute the same instruction in half time.

22. If a 5 MHz crystal is connected with 8085; what is the value of system clock frequency and one T-state?

System clock frequency = Crystal frequency/ 2 = 5 MHz/2 = 2.5 MHz. One T-State = $1 / (2.5 \times 10^6) = 0.4 \mu s$.

23. What is an opcode ?

The part of the instruction that specifies the operation to be performed is called the operation code or opcode.

24. 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.

25. List the special purpose registers of 8085.

The special purpose registers of 8085 are:

- a) A (Accumulator)
- b) Flag Register
- c) Instruction Register
- d) Program Counter
- e) Stack Pointer

PART-B

1. Draw the pin diagram of 8085 and explain the various pin details.
2. Explain the functional block diagram and explain architectural features of 8085.
3. Explain the 8085 interrupt system in detail.
4. Explain various machine cycles supported by 8085.



5. a) Compare memory mapped IO and IO mapped IO.

b) Design a memory system for the 8085 processor such that it contains 16Kb of EPROM and 4Kb of RAM.

c) Design a memory system for the 8085 processor such that it contains 8Kb of EPROM and 4Kb of RAM with starting addresses 0000H and A000H.

6. a) Draw and explain timing diagram of the following instructions of 8085 microprocessor
i) LDA 2050H ii) RET .

b) Draw the 8085 timing diagram for execution of the instruction “MV1 A, 32h” and explain.

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UNIT II PROGRAMMING OF 8085 PROCESSOR

PART-A

1. List any two data manipulation instructions.

Data manipulation instructions are those that perform arithmetic, logic, shift operations.

Ex: Data transfer group – MOV, MVI, LXI Arithmetic group – ADD, SUB, INR Logical group – ANA, XRA, CMP

2. What is meant by lookup table?

The Look-up Table (LUT) is a common concept used to reduce processing time for applications that uses complex calculations. Basically, the LUT contains data or results from the complex calculations needed by application, which was done beforehand—once. By keeping the results in the LUT, when the application needs the values, instead of having to do the calculations, it can just refer to the LUT and retrieve the values from it; bypassing the calculations.

3. Mention the similarity and difference between compare and subtract instructions. Similarity:

Both the subtraction and comparison are performed by subtracting two data in ALU and flags are altered depending upon the result.

Difference: After subtract instruction is executed, the result is stored in accumulator, but after the execution of compare instruction the result is discarded (i.e. , the subtract instruction alters the content of destination register (accumulator), but the compare instruction will not alter the content of any register or memory).

4. State the purpose and importance of NOP instruction.

The NOP is a dummy instruction; it neither achieves any result nor affects any CPU register. This is used for producing software delay and reserve memory spaces for future software modifications.

5. What are the different addressing modes of 8085?

The various formats of specifying the operands are called as addressing modes, it is used to access the operands or data. The different types are as follows

- Immediate addressing
- Register addressing
- Direct addressing
- Indirect addressing



e. Implicit addressing

6. What are the instructions associated with a subroutine?

A subroutine is a group of instructions that will be used repeatedly in different locations of the program. The 8085 has two instructions for dealing with subroutines.

- The CALL instruction is used to redirect program execution to the subroutine.
- The RET instruction is used to return the execution to the calling routine.

7. List out the five categories of the 8085 instructions. Give example 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.

8. What is a stack in an 8085 micro computer system?

The stack is an area of memory identified by the programmer for temporary storage of information.

- The stack is a LIFO structure – Last In First Out.
 - The stack normally grows backwards into memory.
 - In other words, the programmer defines the bottom of the stack and the stack grows up into reducing address range.
- In the 8085, the stack is defined by setting the SP (Stack Pointer) register.

- LXI SP, FFFFH

The Size of the stack is limited only by the available memory

9. What is indexing ?

Specify the location of the data: **Indexing**.The starting location of the data can be specified by loading the memory address into a register pair and using the register pair as a memory pointer or index.

10. State the function of given 8085 instructions: JP, JPE, JPO, JNZ

JP --- Jump on positive (Jump if sign flag =0)

JPE --- Jump on parity even (Jump if parity flag =1) JPO --- Jump on parity odd (Jump if parity flag =0) JNZ --- Jump on no zero (Jump if zero flag =0)

11. How is PUSH B instruction executed? Find the status after the execution.

PUSH B (1 Byte Instruction)

- Decrement SP
- Copy the contents of register B to the memory location pointed to by SP
- Decrement SP
- Copy the contents of register C to the memory location pointed to by SP

12. Write an ALP to add 5 data bytes stored in memory locations starting at 4500H and display the sum in next memory location.

Program:

MVI C ,05H LXI H ,4500H XRA A



**BACK: ADD M
INX H
DCR C
JNZ BACK
MOV M, A
HLT**

13. Mention the instructions used for data transfer with input/output ports.

IN - Initiate Input Operation OUT - Initiate Output Operation

14. Differentiate CALL instruction from JUMP instruction.

In CALL instruction, address of next instruction is pushed to stack (i.e., Stored in stack memory) before transferring the program control to call address. But JUMP instruction, the address of next instruction is not saved.

15. 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.

16. 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 masks)

17. 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.

18. Define stack and stack related instructions?

The stack is a group of memory locations in the R/W memory that is used for the temporary storage of binary information during the execution of the program. The stack related instructions are PUSH and POP.

19. 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.

20. Why do we use XRA A instruction?

The XRA A instruction is used to clear the contents of the accumulator and store the value 00H.

21. Explain the different instruction formats with example?

The instruction set is grouped in to the following formats

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

22. What are subroutines?

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.



23. What is the significance of 'XCHG' and 'SPHL' instructions?

XCHG: This instruction exchanges the contents of register H with that of D and of L with that of E.

SPHL: This instruction copies the contents of HL register pair into the stack pointer. The contents of H register are copied to the higher order byte of stack pointer and contents of L register are copied to the lower byte of stack pointer. This allows indirect way of initializing stack pointer.

24. What is the value of register A after each of the following instructions? MOV A, #26H RRA RRA RRA RRA SWAP A

Ans: A= 26H

25. Write the operation carried out when 8085 executes RST0 instruction.

When 8085 executes RST0 instructions, the program control is transferred to memory address 0000H. Before transfer the program control RST0 instruction saves the current program counter contents on the stack and decrements stack pointer by 2.

26. What is the function of SIM instruction in 8085?

The SIM instruction masks the interrupts as defined. It also sends out serial data through the SOD pin.

PART-B

1. Explain the addressing modes of 8085 with examples (May/June 2006, April/May2008) (Nov/Dec 2012) (16)
2. Explain the Different types of instruction in 8085. (16)
3. i) Write a program to arrange N numbers in ascending order (Nov/Dec 2005,2012)
ii) Write a program to unpack a two digit BCD number stored at memory location 1C00H. (8)
4. Explain the BCD to Decimal code conversion technique and write 8085 assembly language program for the same.(16)
5. Explain the BCD to seven segment code conversion techniques and write 8085 assembly language program for the same.(16)
6. i) Write a program to calculate the factorial a number 0 to 8. (8).
ii) Write a program to find the number of negative, zero and positivenumbers.(8)
7. i) compare the similarities and difference of CALL and RET instruction with PUSH and POP instruction.(8)
ii) Write an 8085 assembly language program to generate a time delay of 1ms. Show the calculation.(8).

UNIT III 8051 MICRO CONTROLLER

PART-A

1. What are the main features of 8051 microcontroller?



- i) 21 special function registres.
- ii) 64Kbytes program memory
- iii) 64Kbytes address space for external data memory
- iv) 32 bidirectional I/O lines
- v) Four register banks
- vi) High speed programmable serial port

2. What are the advantages of micro controller over micro processor? (Dec-2005)

- i) Small size
- ii) Reliable operation
- iii) Easy to troubleshot and maintenance
- iv) Low cost
- v) Less hardware required

3. What is the difference between 8085 μ P and 8051micro controller? (MAY- 2005)

8085	8051
(i) It is a general purpose digital computer.	(i) It is a special purpose digital controller.
(ii) No SFR's are available	(ii) SFR's are available
(iii) It has only CPU	(iii) It has CPU, memory as well as timers, parallel and serial I/O

4. List the application of micro controller.

- i) Used in process control
- ii) Used in motor speed control
- iii) Used in washing machine control
- iv) Used in peripheral devices
- v) Used in office automation.

5. Explain the function of the PSEN pin of 8051.

PSEN- Program Store Enable

PSEN –pin is used to read the program code in the ROM. It is a low active signal.

6. Name any two 16-bit microcontroller 8051.

- i) 8096 ii) 8097 iii) 8098

7. Write the memory capacity of microcontroller 8051.

The 8051 microcontroller has 64 K bytes memory

8. What happens in power down mode of 8051 microcontroller?

The memory locations of power down RAM can be maintained through a separate small battery back up supply. So that the content of these RAM can be preserved during power failure conditions.

9. Which ports of 8051 are bit addressable?

All ports of 8051- port 0, port 1, port- 2 , port -3 are bit addressable.



10. What do you understand by bit addressable EAM in 8051 microcontroller?

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- The 8051 provides 16 bytes of a bit addressable area.
- It occupies RAM byte addresses from 20H to 2FH
- An addressable bit may be specified by its bit address of 00 H TO 7FH (or) byte address of 20H to 2FH.

11. Name the interrupt in 8051 microcontroller.

- INT 0
- INT 1
- TIMER 0
- TIMER 1
- Serial ports interrupt.

12. Write the vector address and priority sequence of 8051 interrupts.

Interrupt	Vector address	Priority
IE0	0003 H	1
TFO	000B H	2
IE1	0013 H	3
TF1	001B H	4
Serial	0023 H	5

13. What is the significance of EA pin in 8051 microcontroller?

- External Access
- When EA pin is connected to VCC program fetches to the internal ROM address.
- When EA pin grounded, program fetches to the external ROM / EPROM address.
-

14. What are the flags available in 8051?

- Carry flag (CY)
- Auxiliary carry flag (AC)
- Over flow flag (OV)
- Parity flag (P)
- Flag Zero(FO)

15. What is the function of program counter in 8051?

- Program counter is a 16- bit register.
- It is used to hold the address of memory location which is to be executed next.
- It is automatically incremented after every instruction byte fetched by PC incrementer.

16. What are on-chip resources? List those available in the 8051 microcontroller?

- program memory, datamemeory,parallel ports ADC, RTC, serial ports, I²C interface and so on, there are all on chip resources.
- The available resources in 8051 are
 - 4096 byte on-chip program memory
 - 128 bytes on –chip data memory
 - Multi mode serial port
 - 32 bit I/O liner
 - 16 bit Timers/counters



17. Name any four additional hardware features available in micro controllers when compared to microprocessor.

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The microcontrollers has built in ROM, RAM, Parallel I/O, Serial I/O, time counters and a clock circuit.

PART-B

1. Explain the functional block diagram of 8051 in detail.
2. Describe the architecture of 8051 with neat diagram.
3. Draw the pin diagram of 8051 microcontroller and explain its ports structures.
4. Draw the data memory structure of 8051 microcontroller and explain.
5. Discuss about the organization of internal RAM and special function registers of 8051 microcontroller in detail.
6. Explain how interrupt structure of 8051 microcontroller explain how interrupts are prioritized.
7. Describe the different modes of operation of timers in 8051.

UNIT-IV PERIPHERAL INTERFACING

PART-A

1. What is the use of 8051 chip?

Intel's 8251A is a universal synchronous asynchronous receiver and transmitter compatible with Intel's Processors. This may be programmed to operate in any of the serial communication modes built into it. This chip converts the parallel data into a serial stream of bits suitable for serial transmission. It is also able to receive a serial stream of bits and converts it into parallel data bytes to be read by a microprocessor.

2. What are the different types of methods used for data transmission?

The data transmission between points involves unidirectional or bi-directional transmission of

meaningful digital data through a medium. There are basically three modes of data transmission

- (a) Simplex
- (b) Duplex
- (c) Half Duplex

In simplex mode, data is transmitted only in one direction over a single communication channel. For example, a computer (CPU) may transmit data for a CRT display unit in this mode. In duplex mode, data may be transferred between two transmitters in both directions simultaneously. In half duplex mode, on the other hand, data transmission may take place in either direction, but at a time may be transmitted only in one direction. For example, a computer may communicate with a terminal in this mode. When the terminal sends data (i.e. terminal is sender). The message is received by the computer (i.e. computer is receiver). However, it is not possible to transmit data from the computer to terminal and from terminal to the computer simultaneously.

3. What is the various programmed data transfer method?

- ii) Asynchronous data transfer
- iii) Interrupt driven data transfer



4. 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 a 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.

5. 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.

6. 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.

7. 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.

8. Write the features of mode 0 in 8255?

1. Two 8-bit ports (port A and port B) and two 4-bit ports (port C upper and lower) are available. The two 4-bit ports can be combined used as a third 8-bit port.
2. Any port can be used as an input or output port.
3. Output ports are latched. Input ports are not latched.
4. A maximum of four ports are available so that overall 16 I/O configurations are possible.

9. What are the features used mode 1 in 8255?

Two groups A and group B are available for strobe data transfer.

1. Each group contains one 8-bit data I/O port and one 4-bit control/data port.
2. The 8-bit data port can be either used as input or output port. The inputs and outputs both are latched.
3. Out of 8-bit port C, PC0-PC2 is used to generate control signals for port B and PC3-PC5 are used to generate control signals for port A. The inputs PC6, PC7 may be used as independent data lines.

10. What are the signals used in input control signal and output control signals?

Input control signals STB (Strobe input) IBF (Input buffer full) INTR (Interrupt request)
Output control signal OBF (Output buffer full) ACK (Acknowledge input) INTR (Interrupt request)

11. What are the features used mode 2 in 8255?

The signals 8-bit port in group A is available.

1. The 8-bit port is bi-directional and additionally a 5-bit control port is available.
2. Three I/O lines are available at port C, viz PC2-PC0.



3. Inputs and output are both latched.
4. The 5-bit control port C (PC3-PC7) is used for generating/accepting handshake Signals for the 8-bit data transfer on port A.

12. What are the modes of operation used in 8253?

Each of the three counters of 8253 can be operated in one of the following six modes of operation.

1. Mode 0 (Interrupt on terminal count)
2. Mode 1 (Programmable monoshot)
3. Mode 2 (Rate generator)
4. Mode 3 (Square wave generator)
5. Mode 4 (Software triggered strobe)
6. Mode 5 (Hardware triggered strobe)

13. What are the different types of write operations used in 8253?

There are two types write operation in 8253

- (1) Writing a control word register
- (2) Writing a count value into a count register

The control word register accepts data from the data buffer and initialize

- (a) Initializing the operating modes (mode 0- mode 4)
- (b) Selection of counters (counter 0- counter 2)
- (c) Choose binary /BCD counters.
- (d) Loading of the counter registers.

The mode control register is a write only register and the CPU cannot read its contents.

14. Give the different types of command words used in 8259A

The command words of 8259A are classified in two groups

1. Initialization command words (ICWs)
2. Operation command words (OCWs)

15. Give the operation modes of 8259A?

- (a) Fully Nest Mode
- (b) End of Interrupt
- (c) Automatic Rotation
- (d) Automatic EOI mode
- (e) Specific Rotation
- (f) Special Mask Mode
- (g) Edge and level Triggered Mode
- (h) Reading 8259 Status
- (i) Poll command
- (j) Special Fully Nested Mode
- (k) Buffered Mode
- (l) Cascade Mode

16. Define scan counter?

The scan counter has two modes to scan the key matrix and refresh the display. In the encoded mode, the counter provides binary count that is to be externally decoded to provide the scan lines for keyboard and display. In the decoded scan mode, the counter internally decodes the least significant 2 bit and provides a decoded 1 out of 4 scan on SL3-SL 3. The keyboard and display both are in the same mode at a time.

17. What is the output modes used in 8279?

8279 provides two output modes for selecting the display options.

2. In this mode, 8279 provides 8 or 16 character- multiplexed displays those can be organized as dual 4-bit or single 8-bit display units.
3. Display Entry 8279 allows options for data entry on the displays. The display data is entered for display from the right side or from the left side.

18. What are the modes used in keyboard modes?

1. Scanned Keyboard mode with 2 Key Lockout
2. Scanned Keyboard with N-Key



Rollover. 3. Scanned Keyboard Special Error Mode. 4. Scanned Matrix Mode.

19. What are the modes used in display modes?

1. Left Entry Mode In the left entry mode, the data is entered from the left side of the display unit.
2. Right Entry Mode In the right entry mode, the first entry to be displayed is entered on the rightmost display.

20. What is the use of modem control unit in 8251?

The modem control unit handles the modem handshake signals to coordinate the communication between the modem and the USART.

21. List the operation modes of 8255?

- a) I/O Mode
 - i. Mode 0- Simple Input/Output.
 - ii. Mode 1- Strobe Input/Output (handshake mode)
 - iii. Mode 2- Strobe bi-directional mode
- b) Bit Set/Reset Mode.

22. What is a control word?

It is a word stored in a register (control register) used to control the operation of a program digital device.

23. What is the purpose of control word written to control register in 8255?

The control words written to control register specify an I/O function for each I/O port. The bit D7 of the control word determines either the I/O functions of the BSR function.

24. What is the size of ports in 8255?

Port - A : 8- bits Port - B : 8- bits
Port -CU : 4- bits Port -CL : 4- bits

25. What is an USART?

USART stands for universal Synchronous / Asynchronous Receiver / Transmitter. It is a programmable communication interface that can communicate by using either synchronous or asynchronous serial data.

26. What is the use of 8251 chip?

8251 chip is mainly used as the asynchronous serial interface between the processor and the external equipment.

27. The 8279 is a programmable ----- interface.

Keyboard/ Display

28. List the major components of the Keyboard/ Display interface.

- a. Keyboard section
- b. Scan section
- c. Display section
- d. CPU interface section

29. What is Key bouncing?

Mechanical switch are used as keys in most of the keyboard. When a key is pressed the contact bounce back and forth and settle down only after a small time delay (about 20ms). Even though



a key is actuated once, it will appear to have been actuated several times. This problem is called Key Bouncing.

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30. What is TXD?

TXD- Transmitter Data Output

This output pin carries serial of the transmitted data bits along with other information like start bit, stop bits and priority bit.

31. Define HRQ?

The hold request output request the access of the system bus. In non- cascaded 8257 systems, this is connected with HOLD pin of CPU. In cascade mode, this pin of a slave is connected with a DRQ input line of the master 8257, while that of the master is connected with HOLD input of the CPU.

32. What is RXD?

RXD- Receive Data Input

This input pin of 8251A receives a composite stream of the data to be received by 8251A.

33. 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.

34. What is setting or conversion time in DAC?

The time taken by the DAC to convert a given digital data to corresponding analog signal is called conversion time.

35. What are the different types of ADC?

The different types of ADC are successive approximation ADC, counter type ADC, flash type ADC, integrator converters and voltage to frequency converters.

PART-B

1. Explain any one of the modes of 8255 in detail. (May 07, Dec -11,13) (16)
2. With neat block diagram explain PPI.(June-13,14) (16)
3. i) Using model, write a program to communicate between two microprocessors using 8255. (June-13,) (10)
ii) Show the control word format of 8255 and explain how each bit is programmed.(6)
4. With neat block diagram explain the functions of 8259. (Dec-12) (16)
5. i) Bring about the features of 8251. (6)
ii) Discuss how 8251 is used for serial communication of data. (6)
iii) Explain the advantages of using the USART chips in microprocessor based systems. (4)
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

7. Explain the 7 segment LED interface with microprocessor. (16)

8. i) Explain the advantages of using the keyboard and display controller chips in microprocessor based system. (6)

ii) Write a program using RST 5.5 interrupt to get an input from keyboard and display it on the display system. (6)

iii) Use RST 5.5 instead of RST 7.5 and change mask pattern accordingly.(4)

9. i) Explain the working of 8254 timer and write a program using it to generate a square waveform of period 3 msec. (10)

ii) Describe with any one of the mode configurations of 8254 timer in detail.(6)

10. Explain how to convert an analog signal into digital signal. (16)

UNIT V 8051 MICRO CONTROLLER PROGRAMMING & APPLICATIONS

PART-A

1. What is micro controller?

Micro controller is a microprocessor with limited number of RAM, ROM, I/O ports and timer on a single chip i.e. all the required hardware for a system is combined together on a single chip.

2. Mention any two real time micro controllers.

- Micro oven
- Washing machine

3. Give any two differences between microprocessor and micro controller.

Microprocessor	Micro controller
Register-oriented architecture	Memory-oriented architecture
It do not have internal ROM, RAM and I/O port	It contains RAM, ROM and I/O in a single chip

4. What are the bits used in the program status word of 8031 micro controller?

The various status bits used are the carry bit, auxiliary carry bit, overflow bit, parity bit, general purpose flag bit and register select bank control bits.



5. What is the use of PSEN signal used in IC 8031?

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It is the control signal that enables the external program memory. When the device executes the program from external program memory PSEN is activated. During the execution of internal program memory PSEN is not activated.

6. What are the registers used for timer operations?

The registers used for timer operation are TH0, TH1, TL0, TL1, TMOD, TCON and IE.

7. What is the difference between mode 0 and mode 1 timer operation of IC8031?

In mode 0 13 bits register is used whereas in mode1 16 bits register is used.

8. What is meant by transition activated interrupts?

In transition-activated interrupts, the timer control register bits are set when the transition at the INT input (changes from logic 1 to 0 or vice versa).

9. What are the use of MOVC and MOVX instruction?

MOVC-used to move the data from code (program) memory to accumulator.

MOVX-used to move the data from external memory to the accumulator.

10. Give any two differences between LCALL and ACALL instruction.

Long call (LCALL)

3 byte instruction

Issues 11 bit absolute addressing

Absolute call (ACALL)

2byte instruction

It addresses full 64 Kbytes

11. List some assembler directives used by the compiler of 8031.

- ORG
- EQU
- DFB

12. What is meant by power down mode? (NOV/DEC 2010)

In 8096 micro controller the upper 16 bytes of RAM is called power down RAM because these locations receive their power from the Vpd pin in the power down mode. Hence in the power down only these locations are alive.

13. Specify the functions of various ports in 8096.

Port 0 – input port, used for A to D converter inputs.

Port 1- bi directional ports

Port 2- input, output as well as bi-directional pins

Port 3,4- bi directional ports used to expand the memory.

14. Why the ALU used in 8096 is called as RALU?

Here the ALU can access all the registers in the RAM memory and no need for accumulator. Hence this memory is termed as RALU.



15. Give any four features of 8096.

- Contains full duplex serial port
- Watch dog timer to recover from errors
- Programmable 8-source priority interrupt system.
- Hardware multiply and divide instruction

16. What is cross assembler? (NOV/DEC 2009)

Assemblers which run on one CPU but which generate object code for another CPU are called cross assemblers.

17. What is the basic difference between counter and timer?

In the case of timer operation counter is connected to the internal clock where as in counter operation it is connected to the external clock having different baud rates.

18. What is use of DPTR in 8031 micro controllers?

It consists of a high byte and low byte data of a 16-bit external data RAM address. It is accessed as a 16 bit register or 2,8 bit registers.

19. What was the first developed microprocessor?

The first developed Intel microprocessor was 4-bit 4004 processor.

20. Mention any few 8-bit and 16-bit micro controllers.

8 bit micro controllers- Intel 8051, PIC 16C56, motorolo 6805, TMS 7500.
16 bit micro controllers- H81532, Intel 8096, MCS-96 family.

21. What are the input units used to generate digital data inputs?

DIP switches and thumb switches are the 2 different input units used to give digital input to the processor.

22. What are the three different types of DIP switches? [APRIL/MAY 2011]

- Piano DIP switches
- Slide DIP switches
- Tristate DIP switches

23. What does thumb switches mean?

These are rotary mechanical devices that convert the displayed decimal numbers to binary mechanical positions and are read electronically by an electronic counter or a microprocessor.

24. What is the function of watchdog timer?

A Watch dog timer resets the PIC if the chip ever malfunctions and deviates from its normal operation.

25. What is data memory space? (APRIL/MAY 2009)



The processor can read data from this memory space and can write data to this memory space. It cannot execute program instructions from this memory space. 8051 internal RAM is in this memory space.

26. What is called down loaded program?

The 8051 can input a block of data through its serial communications port, load that data into memory, and then execute that data as a program. It is used to change the program operating in a remote microprocessor based controller.

27. What is scratch pad?

It is an 8-bit register. It is incremented just before data is stored by using the push or call instructions or the interrupt.

28. What is port latch?

The port latch allows storing data going out of the port or coming to the port.

8051 APPLICATIONS

1. What are the basic digital output units used in microcomputer?

A simple system uses 7-segment LED displays for numbers and hexadecimal letters, 18-segment LED display or 5 x 7 matrix LED displays for displaying numbers and letters of an alphabet.

2. Why the seven segment LED display is referred as static display? (Nov/Dec-2010)

In this circuit the current is passed through the display at all times, and hence it is referred as static display.

3. Give any two differences between memory mapped and peripheral mapped I/O interfacing.

Memory mapped I/O interfacing

Peripheral is identified by 16-bit memory address

Data transfer is implemented by using memory related instructions such as STA, LDA, MOV M,R and MOV R,M.

Peripheral mapped I/O interfacing

Peripheral is identified with an 8-bit address

Data transfer is implemented by IN and OUT instructions.

4. What are the interface devices used to connect output port and high power devices?

Integrated circuit buffers and transistor buffers are used as interface devices between the output port pins and high power devices.

5. What is the use of sample and HOLD IC?

Sample and hold circuit samples an input signal and holds on to its last sampled value until the input is sampled again.

6. What is aperture time?

It is the delay required between HOLD command and an input analog transition, so that the transmission does not affect the held output.



7.State some applications of sample and HOLD circuit.

- Automatic test systems
- Industrial process controls
- Arbitrary function generators
- Avionics equipment

8.What is the disadvantage in keyboard interfacing using ports?

The disadvantage in keyboard interfacing using ports is that most of the processor time is utilized in keyboard scanning and debouncing. As a result the computational speed of the processor will be reduced.

9.What is the advantage in using INTEL 8279 for keyboard and display interfacing?

When 8279 is used for keyboard and display interfacing, it takes care of all the task involved in keyboard scanning and display refreshing. Hence the processor is relieved from the task of keyboard scanning, debouncing, keyboard generation and display refreshing and the processor time can be more effectively used for computing.

10.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 can be altered or changed by a program instruction then the peripheral device is called programmable device.

11.What is synchronous data transfer scheme?

In synchronous data transfer scheme, the processor does not check the readiness of the device after a command have 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.

12.What is asynchronous data transfer scheme?

In 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.

13.What is an interfacing circuit? (Nov/Dec-2009)

An interfacing circuit is an electronic circuit, which is used to connect the peripherals to the computer.

14. What are the input devices used in single board microcomputer?

The input devices used in single board microcomputer are hex keyboard, DIP switches, ADC, floppy disc etc

15.What are the output devices used in single board microcomputer?

The output devices used in single board microcomputer are 7 segment LEDs, LCD display, Printer, Floppy disc , CRT terminal etc

16. How is an input and output device interfaced with 8085 microprocessor?



An input and output device is interfaced with 8085 microprocessor either as a peripheral I/O or as a memory mapped I/O. In the peripheral I/O, the instructions IN/OUT are used for data transfer, and the device is identified by an 8 bit address. In the memory mapped I/O, memory related instructions are used for data transfer, and the device is identified by a 16 bit address.

17. What is a port?

A Port is a buffered IC, which is used to hold the data transmitted from microprocessor to I/O device or vice-versa.

18. What is the need for port?

The I/O devices are generally slow devices and their timing characteristics do not match with processor timings. Hence the I/O devices are connected to system bus through the ports.

19. Give some examples of port devices used in 8085 microprocessor based system.

The various INTEL I/O port devices used in 8085 microprocessor-based systems are 8212, 8155, 8156, 8255, 8355 and 8755.

20. Can an input port and output port have the same port address?

Yes. They will be differentiated by control signals. The RD is used to enable the input port and the WR is used to enable the output port.

21. What are the different methods of interfacing I/O devices to 8085-based system?

The different methods of interfacing I/O devices are,

- a) Memory mapped I/O device
- b) Standard mapped I/O Device (or) Isolated mapping

22. What are the parts of seven segment LED?

Seven segment LED consists of seven light emitting diode segments and one segment for the decimal point.

23. Give some applications of seven segments LED

They are used on calculators and other products, which only need limited display. It can give limited alphabetical information.

24. What are the two types of 7 segments LED?

The two types of 7 segments LED are,

- a) Common anode type
- b) Common Cathode type

25. Explain how the seven segment LEDs are interfaced to 8085 processor.

The seven segment LEDs are interfaced to 8085 processor using INTEL 8279 keyboard and display controller. The 8279 is a dedicated controller which takes care of keyboard scanning and display refreshing. A maximum of 16 number of 7 Segment LEDs can be interfaced using one 8279 in 8085 based system as multiplexed display.

26. What is a multiplexed display?



The process of switching ON the display devices one by one for a specified time interval is called Multiplexed display. In microprocessor based systems six to eight 7 segment LEDs are interfaced to provide multiplexed display. At any one time only one 7 segment LED is made to glow. After few milliseconds the next & segment LED is made to glow and so on. Due to persistent of vision, it will appear as if the LEDs are glowing continuously.

27. Give some advantages of multiplexed display?

The advantages of multiplexed display are,

- Only one BCD to 7 segment decoder, IC 7447 is needed for all the 7 segment LEDs.
- In a current requirement of one 7 segment LED, 6 to 8 LEDs can be displayed or interfaced.
- The power requirements of the display devices are reduced to a very large extent.

28. Define memory mapped I/O. (Apr/May-06)

Microprocessor such as the 8085 and Z80 can address 256 output ports and 256 input ports by use of output and input instructions in the microprocessor program. One way to expand beyond this number of ports is to define memory location as I/O ports. An instruction to write memory at such a location is interpreted by the external hardware as an output. An instruction to read memory is interpreted as an input. Defining I/O ports in this way is called memory mapped I/O.

29. Compare the memory mapped I/O and Standard mapped I/O

Memory mapped I/O

- 16 bit address is allotted to an I/O device
- The devices are accessed by memory read or memory write cycle
- All instructions related to memory can be used for data transfer
- A large number of I/O ports can be interfaced.

Standard mapped I/O

- 8 bit address is allotted to an I/O device
- The devices are accessed by I/O 8 read or I/O write cycle
- Only IN and OUT instructions can be used for data transfer
- Only 256 ports can be interfaced

PART-B

1. Explain the different addressing modes in 8051 in detail. (Dec-09) (16)
2. Explain the data transfer instruction and program control instructions of 8051. (Dec-07,08,11,May-11) (16)
3. Explain with a neat diagram the application of 8051 microcontroller in washing machine control. (May-12,14) (16)
4. With a neat circuit diagram explain how a 4x4 keypad is interfaced with 8051 microcontroller and write 8051 ALP for keypad scanning. (May -07,08,11) (16)
5. Explain how a stepper motor can be interfaced with 8051 microcontroller with a neat sketch? (Dec-06) (16)



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6. Explain how to control the servo motor using 8051 microcontroller and list any four applications of servo motor.(Dec-12) (16)
7. Explain the interfacing of keyboard / display with 8051 microcontroller.(May-12) (16)
8. Write an 8051 assembly language program to copy 10 bytes of data stored from location 30H to another location starting from 50 H.

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