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Question Paper Code : 11322

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2011

Sixth Semester

Electrical and Electronics Engineering

EE 2354 — MICROPROCESSORS AND MICROCONTROLLERS

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions

PART A — (10 × 2 = 20 marks)

1. Specify the size of data, address, memory word and memory capacity of 8085 microprocessor.
2. How is the memory segment accessed by 8086 microprocessor identified?
3. State the function of given 8085 instructions: JP, JPE, JPO, JNZ.
4. How is PUSH B instruction executed? Find the status after the execution.
5. What are the different ways to end the interrupt execution in 8259 programmable Interrupt controller?
6. What is the function of Scan section in 8279 programmable keyboard/Display Controller?
7. List the alternative functions assigned to Port 3 pins of 8051 microcontroller.
8. Mention the size of DPTR and Stack Pointer in 8051 microcontroller.
9. What is the operation of the given 8051 microcontroller instructions: XRL A, direct?
10. What are the different operations performed by Boolean variable instructions of 8051?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the architecture, data flow and instruction execution of 8085 microprocessor. (8)
(ii) With timing diagram, explain the memory read operation in 8085 microprocessor. (8)

Or

- (b) (i) Show the pin configuration and function of signals of 8086 microprocessor. (8)
(ii) Show the memory organization and interfacing with 8086 microprocessor. Explain how the memory is accessed. (8)
12. (a) (i) Describe the instruction format and addressing modes of 8085 microprocessor. (8)

- (ii) Write an assembly language program based on 8085 microprocessor instruction set to search the smallest data in a set. (8)

Or

- (b) (i) With suitable example, discuss about 8085 microprocessor instructions used for data manipulation. (8)
- (ii) Write an assembly language program based on 8085 microprocessor instruction set to find the square root of data from 1 to n using Lookup table. (8)
13. (a) (i) Explain the operation of 8255 PPI Port A programmed as input and output in Mode 1 with necessary handshaking signals. (8)
- (ii) Show and explain the ADC interfacing with 8085 microprocessor. (8)

Or

- (b) With functional block diagram, explain the operation and programming of 8251 USART in detail. (1)
14. (a) Discuss about the organization of Internal RAM and Special function registers of 8051 microcontroller in detail. (16)

Or

- (b) (i) Explain the Interrupt structure with the associated registers in 8051 microcontroller. (8)
- (ii) Explain in detail the modes of operation of Timer unit in 8051 microcontroller. (8)
15. (a) (i) Explain the Data transfer instructions and Program control instructions of 8051 microcontroller. (8)
- (ii) Write an assembly language program based on 8051 microcontroller instruction set to perform four arithmetic operations on 2, 8 bit data. (8)

Or

- (b) (i) Explain the interfacing of Keyboard/Display with 8051 microcontroller. (8)
- (ii) Explain the Servomotor control using 8051 microcontroller. (8)

Reg. No. :

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Question Paper Code : 10330

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Sixth Semester

Electrical and Electronics Engineering

EE 2354 — MICROPROCESSORS AND MICROCONTROLLER

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is TRAP interrupt and its significance?
2. Define the function of parity flag and zero flag in 8085.
3. What are the types of addressing mode in 8085 microprocessor?
4. What is the use of branching instructions? Give example.
5. What are the applications of D/A converter interfacing with 8255?
6. What is keyboard interfacing?
7. What are the main features of 8051 microcontroller?
8. Draw the flowchart for programming of serial port of 8051.
9. What is program status word of 8051?
10. What are the applications of 8051 microcontroller?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain with a neat block diagram the architecture of 8085 microprocessor. (12)
- (ii) Draw the pin diagram of 8085 microprocessor. (4)

Or

- (b) (i) Describe the different types of interrupts used in 8085 microprocessor. (8)
- (ii) Draw the timing diagram of Opcode fetch machine cycle and I/O Read cycle. (8)
12. (a) (i) Describe the addressing modes of 8085 microprocessor with suitable instructions. (8)
- (ii) Describe with a suitable example the operation of stack. (8)

Or

- (b) (i) Describe with suitable examples the data transfer, loading and storing instructions. (8)
- (ii) Write an assembly language program for arranging an array of 8 bit unsigned number in ascending order. (8)
13. (a) (i) Describe the comparison of I/O mapped and memory mapped I/O interfacing. (6)
- (ii) Explain with a neat diagram the interfacing of 8251 to 8085 microprocessor. (10)

Or

- (b) (i) Draw and explain the functional block diagram of 8259 programmable interrupt controller. (8)
- (ii) Draw and describe the interfacing of A/D and D/A converter interfacing to 8085 microprocessor. (8)
14. (a) Explain with a neat block diagram the architecture of 8051 microcontroller. (16)

Or

- (b) (i) Explain the different operating modes of timer in 8051 microcontroller. (8)
- (ii) Explain program memory interfacing in 8051 microcontroller. (8)

15. (a) (i) Explain the stepper motor control using 8051. (8)
- (ii) Write a program to generate pulses to drive and for continuous operation of a stepper motor. (8)

Or

- (b) Explain with a neat diagram the application of 8051 microcontroller in Washing Machine control. (16)
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Anna University
B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2011.
Sixth Semester
Electrical and Electronics Engineering
EE 2354 — MICROPROCESSORS AND MICROCONTROLLER
(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the schematic of latching low-order address bus in 8085 microprocessor.
2. If the stack segment register contains 3000h and stack pointer register contains 8434h, what is the physical address of the top of the stack in 8086 microprocessor?
3. Why do we need look-up table?
4. How are the 8085 instructions classified according to the functional categories?
5. Draw the 'Mode Word' format of 8251 USART.
6. State the use of ISR and PR registers in 8259 PIC.
7. List the on-chip peripherals of 8051 microcontroller.
8. What are the addressing modes of 8051 microcontroller?
9. Why do we need opto-isolator circuit between microcontroller and the Stepper motor?
10. Mention the I/O instructions of 8051 microcontroller.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain in detail the 8085 interrupt structure. (8)
- (ii) Draw the timing diagram for IN and OUT instruction of 8085 and explain. (8)

Or

- (b) (i) Draw the internal block diagram of 8086 and explain the bus interface unit and execution unit. (8)
- (ii) How address decoding is done in memory Interface. (8)
12. (a) (i) Write a program to count from 0 to 9 with one second delay between each count. At the count of 9, the counter should reset itself to 0 and repeat the sequence continuously. Assume the clock frequency is 1 MHz. (8)
- (ii) Write a program with a flowchart to multiply two 8-bit numbers. (8)

Or

- (b) (i) Compare the similarities and differences of CALL and RET instructions with PUSH and POP instructions. (8)
- (ii) Sixteen bytes are stored in memory locations at XX50h to XX5Fh. Transfer the entire block of data to new memory locations starting at XX70h. (8)

13. (a) (i) Explain the operating modes of 8255 programmable peripheral interface. (8)
- (ii) Draw the logical block diagram of 8279 keyboard display controller and explain. (8)

Or

- (b) (i) Draw the control word of 8253 timer/counter and explain the operating modes of 8253 timer/counter. (8)
- (ii) Why do we need A/D converter and D/A converter? Draw the block diagram to interface 8085 microprocessor with A/D convertor and D/A convertor. (8)

14. (a) (i) Explain the program memory and data memory structure of 8051 microcontroller. (8)
- (ii) Draw the pin diagram of 8051 microcontroller and explain its port structure. (8)

Or

- (b) (i) Draw the TMOD register format and explain the different operating modes of timer in 8051 microcontroller. (8)
- (ii) Explain how serial communication is performed in 8051 microcontroller. (8)

15. (a) (i) Explain with a program to rotate the stepper motor in both clockwise and anticlockwise direction using 8051 microcontroller. (8)

(ii) How to interface a 7 segment display using 8051 microcontroller. (8)

Or

(b) (i) How 8051 is used in washing machine control? (8)

(ii) How do you interface a 4×4 matrix keyboard using 8051 microcontroller? (8)

UNIT-1 8085 and 8086 MICROPROCESSOR

TWO MARKS

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

A microprocessor is a multipurpose, programmable logic device that reads binary instructions from a storage device called memory accepts binary data. As input and processes data according to those instructions and provides result as output. The power of 8085 is +5v and clock frequency in 3MHZ.

2. List the allowed register pairs of 8085.

B-C register pair D-C register pair H-L register pair.

3. 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.

4. What is an opcode ?

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

5. 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

6. 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.

7. 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 RST7.5,RST6.5,RST5.5.the priority of interrupts in 8085 is shown in the table.

Interrupts	priority
TRAP	1
RST7.5	2
RST6.5	3
RST5.5	4
INTR	5

8. What is the signal classification of 8085?

All the signals of 8085 can be classified into 6 groups

- | | |
|---------------------------------|---------------------------------------|
| 1. Address bus | 2. Data bus |
| 3. Control and status signals | 4. Power supply and frequency signals |
| 5. Externally initiated signals | 6. Serial I/O ports |

9. 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.

10. 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.

11. How many machine cycles does 8085 have, mention them?

The 8085 have seven machine cycles they are

- 1. Opcode fetch 2. Memory read
- 3. Memory write 4. I/O read
- 5. I/O write 6. Interrupt acknowledge
- 7. Bus idle

12. Steps involved to fetch a byte in 8085?

HOLD indicates that a peripheral such a 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 accept or send data.

SID is used to accept serial data bit by bit.

13. Define flags?

The flags are used to reflect the data conditions in the accumulator.the 8085 flags are s-sign flag,zero flag,auxillary flag,parity flag,CY-CARRY FLAG

D7 D6 D5 D4 D3 D2 D1 D0

S Z AC P CY

14. Difference between memory mapped I/O and peripheral I/O ?

MEMORY MAPPEED I/O	PERIPHERAL I/O
16-bit device address	8-bit device address
The data transfer between any general-purpose register and I/O port	The data transfer only between accumulator and I/O port
The memory map(64kb)is shared between I/O device and system memory	The I/O map is independent of the memory map,256 input device and 256 output device
More hardware is required to decode 16-bit address	Less hardware is required to decode 8-bit address

15. Define pipelining?

In 8086, to speedup the execution of program, the instructions fetching and execution of instructions are overlapped each other. This technique is known as pipelining. In pipelining, when then the instruction is executed, the n+1 the instruction is fetched and thus the processing speed is increased.

16.. Discuss the function of instruction queue in 8086?

In 8086, a 6-byte instruction queue is presented at the Bus Interface Unit (BIU). It is used to pre-fetch and store at the maximum of 6 bytes of instruction code from the memory. Due to this, overlapping instruction fetch with instruction execution increases the processing speed.

17. What is the maximum memory size that can be addressed by 8086?

In 8086, an memory location is addressed by 20 bit address and the address bus is 20 bit address and the address bus is 20 bits. So it can address up to one mega byte (2^{20}) of memory space.

18. What is the clock frequency of 8086?

Microprocessor	8086	8086-2	8086-4
Internal clock Frequency	5 MHz	8MHz	4MHz
External Clock Frequency	15MHZ	24MHZ	12MHZ

19. What are the two modes of operations present in 8086?

- i. Minimum mode (or) Uniprocessor system
- ii. Maximum mode (or) Multiprocessor system

20. Explain the process control instructions

STC – It sets the carry flag & does not affect any other flag

CLC – it resets the carry flag to zero & does not affect any other flag

CMC – It complements the carry flag & does not affect any other flag

STD – It sets the direction flag to 1 so that SI and/or DI can be decremented automatically after execution of string instruction & does not affect other flags

CLD – It resets the direction flag to 0 so that SI and/or DI can be incremented automatically after execution of string instruction & does not affect other flags

STI – Sets the interrupt flag to 1. Enables INTR of 8086.

CLI – Resets the interrupt flag to 0. 8086 will not respond to INTR.

PART B

- 1. Describe the functional pin diagram of 8085. (16)
- 2. Describe the functional block diagram of 8085. (16)
- 3. Explain the 8085 interrupt system in detail. (16)
- 4. Explain various machine cycles supported by 8085. (16)
- 5. a) With suitable examples explain how I/O devices are connected using memory mapped

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- I/O and peripheral I/O. (10)
- b) Design a microprocessor system to interface an $8K \times 8$ EPROM and $8K \times 8$ RAM. (6)
6. Draw and explain the architecture of 8086. (16)
- 7.(i)What is the difference between minimum and maximum modes of 8086? How are these modes selected.(10)
- (ii) Explain the concept of pipelining in 8086. Discuss its advantages and disadvantages.(6)
8. How many interrupts are available in 8086?List the predefined software interrupts available in 8086.(16)
- 9 (i) Describe the sequence of event that may occur during the different T state in the opcode fetch machine cycle of 8086? (8)
- (ii) List out the maskable and non maskable interrupts available in 8086? (6)
- 10.(i) Explain the minimum mode of operation of 8086. (12)
- (ii)Write notes on addressing input and output devices? (4)
- 11.(i) Explain the Maximum mode of operation of 8086. (12)
- (ii)Write short notes on addressing memory. (4)
- 12(i) Design an 8086 based system in minimum mode containing 64kb of EPROM and 64kb of RAM (12)
- (ii) Give the functions of NMI, BHE and TEST pins of 8086? (4)
-

UNIT-2 PROGRAMMING OF 8085 PROCESSOR

TWO MARKS

1. What is an instruction?

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

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

There are 74 operations in the 8085 microprocessor

3. 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. | |

4. 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.

5. 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.

6. 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.

7. 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)

8. 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
4. Branching JNZ CALL 16-bit
5. Machine control HLT,NOP

9. 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.

10. Explain the different instruction formats with ex?

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

11. What is the use of addressing modes,mention the different types?

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

1. Immediate addressing
2. Register addressing
3. Direct addressing
4. Indirect addressing
5. Implicit addressing

12. 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

13. 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

14. Compare CALL and PUSH instructions

CALL	PUSH
When CALL is executed the microprocessor automatically stores the 16-bit address of the instruction next to CALL on the stack	The program uses the instruction PUSH to save the contents of the register pair on the stack

When CALL is executed the stack pointer is decremented by two

When PUSH is executed the stack pointer register is decremented by two

15. 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.

6. Compare RET and POP RET

POP

RET transfers the content of the top two locations of the stack to the PC

Pop transfers the content of the top two locations of the stack to the specified register pair

When RET is executed the SP is incremented by two and it has 8 conditional RETURN instructions

When POP is executed the SP is incremented by two and no conditional POP instructions

17. 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.

18. 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 $N=0$.

19. 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

20. Define stack?

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

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 is the minimum s/m and how it is formed in 8085?

A minimum s/m is one which is formed using minimum number of IC chips. the 8085 based minimum s/m is formed using 8155, 8355 & 8755.

PART B

1. Explain the addressing modes of 8085 with example. (16)
 2. Explain the Different types of instruction in 8085. (16)
 3. i) Write a program to arrange /n numbers in ascending order. (8)
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 technique and write 8085 assembly language program for the same. (16)
 6. i) Write a program to calculate the factorial of a number between 0 to 8. (8)
ii) Write a program to find the number of negative, zero and positive numbers. (8)
-

UNIT- 3 PERIPHERAL INTERFACING

TWO MARKS

1. What is the use of 8251 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 transceivers 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?

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- i) Synchronous data transfer
- 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

Mode 1-Strobe I/O mode

Mode 2- Strobe bi-direction I/O

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)

INTR (Interrupt request)

IBF (Input buffer full)

Output control signal

OBF (Output buffer full)
INTR (Interrupt request)

ACK (Acknowledge input)

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.

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1. Display scan
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.

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. (16)
2. With neat block diagram explain PPI. (16)
3. i) Using model, write a program to communicate between two microprocessors using 8255. (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. (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

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program to implement the same. (16)

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-IV MICROCONTROLLERS 8051

TWO MARKS

1. What is mean 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. 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.

3. 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

4. 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

5. Specify the single instruction, which clears the most significant bit of B register of 8051, without affecting the remaining bits.

Single instruction, which clears the most significant bit of B register of 8051, without affecting the remaining bits, is CLR B.7.

6. 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.

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

DPTR:

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:

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.

8. 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.			

9. 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.

10. Compare Microprocessor and Microcontroller.

Microprocessor	Microcontroller
1. Microprocessor contains ALU, general Purpose register counter, clock timing Circuit and interrupt circuit.	Microcontroller contains the circuitry of microprocessor and in addition it has Built-in ROM, RAM, I/O devices and Counter.
2. It has many instructions to move data between memory and CPU.	It has many instructions to move data between memory and CPU.
3. It has one or two bit handling instruction .	it has many bit handling instructions.
4. Access times for memory and I/O Devices are more.	Less access times for built-in memory and I/O devices.

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5. Microprocessor based system
requires more hardware

Microcontroller based system requires
less hardware reducing PCB size and
Increasing the reliability.

11. 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 T

Timers interrupt 1: TF1: 001BH

Serial interrupt

Receive interrupt: RI: 0023H

Transmit interrupt: TI: 0023H

12. Write a program to subtract the contents of RI of Bank0 from the contents of R0 of Bank2.

```
MOV PSW, #10
MOV A, R0
MOV PSW, #00
SUBB A, R1
```

13. How the RS-232 serial bus is interrupt to 1TTL logic device?

The RS-232 signal voltage level devices are not compatible with TTL logic levels. Hence for interfacing TTL devices to RS-232 serial bus, level converters are used. The popularly used level converters are MC 1488 & MC 1489 or MAX 232.

14. List some of the features of 8096 microcontroller.

- The 8096 is a 16-bit microcontroller.
- the 8096 is designed to use in application which require high speed calculations and fast I/O operation.
- The high speed I/O section of an 8096 includes a 16-bit timer, a 16-bit counter, a 4 input programmable edge detector, 4 software timer and counter 6-output programmable events Generator.
- It has 100 instructions, which can operate on bit, byte, word and double words.
- The bit operation is possible and these can be performed on any bit in the register file or in the special function register.

15. List the features of 8051 microcontroller?

The features are

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

16. Explain the operating mode 0 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.

17. Explain the operating mode 0 of 8051 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.

For eg: the parity bit (P, in the PSW) could be moved into TB8. On receive the 9th data bit go in to the RS8 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.

18. Explain the mode 3 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, Mode 3 is the same as Mode 2 in all respect except the baud rate. The baud rate in Mode 3 is variable.

In all the four modes, transmission is initiated by any instruction that uses SBUF as a destination register. Reception is initiated in Mode 0 by the condition RI=0 & REN=1. Reception is initiated in other modes by the incoming start bit if REN=1.

19. List the addressing modes of 8051?

- Direct addressing
- Register addressing
- Register indirect addressing
- Implicit addressing
- Immediate addressing
- Index addressing
- Bit addressing

PART-B

1. Describe the architecture of 8051 with neat diagram. (16)
2. i) Discuss the peripheral interface of 8051. (8)
ii) Explain the interrupt structure of 8051 microcontroller Explain how interrupts are prioritized. (8)
i) What is the difference between the Microprocessors and Microcontrollers?(8)
ii) Explain the I/O port structure of 8051. (8)
3. i) Explain the different serial communication modes in 8051. (8)
ii) Explain the memory structure of 8051. (8)
4. States various modes available for timer in 8051. (16)
5. Explain the functional pin diagram of 8051 Microcontroller. (16)

UNIT V MICRO CONTROLLER PROGRAMMING & APPLICATIONS

TWO MARKS

1. Write a program using 8051 assembly language to change the data 55h stored in the lower byte of the data pointer register to AAH using rotate instruction?

```
MOV DPL,#55H
MOV A,DPL
```

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RL A

LABEL : SJMP Label

2. Explain the contents of the accumulator after the execution of the following program segments?

```
MOV A,#3CH
MOV R4,#66H
ANL A,R4
A 3C
R4 66
A 24
```

3. Write a program to load accumulator a,DPH and DPL with 30H?

```
MOV A,#30
MOV DPH,A
MOV DPL,A
```

4. Write a program to perform multiplication of 2 nos using 8051?

```
MOV A,#data 1
MOV B,#data 2
MUL AB
MOV DPTR,#5000
MOV @DPTR,A(lower value)
INC DPTR
MOV A,B
MOVX@DPTR,A
```

5. Write a program to mask the 0th & 7th bit using 8051?

```
MOV A,#data
ANL A,#81
MOV DPTR,#4500
MOVX @DPTR,A
LOOP SJMP LOOP
```

6. Write about CALL statement in 8051?

There are two subroutine CALL instructions.they are

*LCALL(Long CALL)

*ACALL(Absolute CALL)

Each increments the pc to the 1st byte of the instruction & pushes them in to the stack.

7. Write about the jump statement?

There are three forms of jump.they are

LJMP(Long-jump)-address 16

AJMP(Absolute jump)-address 11

Sjmp(short jump)-relative address

8. Write a program to load accumulator DPH & DPL using 8051?

```
MOV A,#30
MOV DPH,A
MOV DPL,A
```


9. Write a program to find 2's complement using 8051?

```
MOV A,R0
CPL A
INC A
```

10. Write a program to add two 8-bit numbers using 8051?

```
MOV A,#30H
ADD A,#50H
```

11. Write a program to swap two numbers using 8051?

```
MOV A,#data
SWAP A
```

12. Write a program to subtract two 8-bit numbers & exchange the digits using 8051?

```
MOV A,#9F
MOV R0,#40
SUBB A,R0
SWAP A
```

13. Write a program to subtract the contents of R1 of bank 0 from the contents of R0 of bank 2 using 8051?

```
MOV PSW,#10
MOV A,R0
MOV PSW,#00
SUBB A,R1
```

14. Explain the operating mode0 of 8051 serial ports?

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

15. 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.

16. 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 by any instruction that uses SBUF as a destination register. reception is initiated in mode0 by the condition R1=0 & REN=1. reception is initiated in other modes by the incoming start bit if REN=1.

17. What are the tasks involved in keyboard interfacing?

The tasks involved in keyboard interfacing are sensing a keyboard interfacing are sensing a key actuation, de-bouncing the key and generating key codes (decoding the key). these tasks are

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performed software if the keyboard is interfaced through ports and they are performed by hardware if the keyboard is interfaced through 8279.

18. How a keyboard matrix is formed in keyboard interface ?

The return lines RL0 to RL7 of 8279 are used to form the columns of keyboard matrix. In decoded scan the scan lines SLO 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.

19. 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.

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

In display devices the process of sending display codes to 7-segment LED'S to display the led's one by one is called scanning. The scan time is the time taken to display all the 7-segment LED'S one by one, starting from first LED and coming back to the first LED again.

21. Give some ex of input devices to microprocessor-based systems

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

PART-B

1. i) Write 8051 ALP to read data from port I when negative edge triggered at INTO and supply the data to port 2 by masking the upper 4 bits. (8)
ii) Write 8051 ALP to transmit 'Hello World' to PC at 9600 baud for external crystal frequency of 11.0592MHz. (8)
 2. With a neat circuit diagram explain how a 4 x 4 keypad is interfaced with 8051 microcontroller and write 8051 ALP for keypad scanning. (16)
 3. Draw the schematic for interfacing a stepper motor with 8051 microcontroller and write 8051 ALP for changing speed and direction of motor. (16)
 4. Draw the schematic for interfacing a servo motor with 8051 microcontroller and write 8051 ALP for servo motor control. (16)
 5. i) Explain addition and subtraction instructions of 8051. (8)
ii) Explain various types of jump instructions according to range. (8)
 6. i) Write a 8051 ALP to find Fibonacci series of N given numbers. (8)
ii) Write a 8051 ALP to find the average of given N numbers. (8)
-

4.2 Part A Questions with Answers & Part B Questions

UNIT-1 8085 MICROPROCESSOR

TWO MARKS

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

A microprocessor is a multipurpose, programmable logic device that reads binary instructions from a storage device called memory accepts binary data. As input and processes data according to those instructions and provides result as output. The power of 8085 is +5v and clock frequency in 3MHZ.

2. List few applications of microprocessor-based system.

It is used:

- i) For measurements, display and control of current, voltage, Temperature, pressure, etc.
- ii) For traffic control and industrial tool control.
- iii) For speed control of machines.

3. 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.

4. List the 16 – bit registers of 8085 microprocessor.

Stack pointer (sp) and program counter (pc).

5. List the allowed register pairs of 8085.

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

6. 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.

7. What is an opcode?

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

8. 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.

9. What is an operand?

The data on which the operation is to be performed is called as an operand.

10. How many address lines in a 4096*8 EPROM CHIP?

12 Address lines.

11.Control signals used for DMA operation are

HOLD and HLDA

12.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.

13.What is meant by polling?

Polling or device polling is a process which identifies the device that has interrupted the microprocessor.

14.What is meant by interrupt?

Interrupt is an external signal that causes a microprocessor to jump to a specific subroutine.

15.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 RST7.5,RST6.5,RST5.5.the priority of interrupts in 8085 is shown in the table.

Interrupts	priority
TRAP	1
RST7.5	2
RST6.5	3
RST5.5	4
INTR	5

16.What is a microcomputer?

A computer that is designed using a microprocessor as its CPU is called microcomputer.

17.What is the signal classification of 8085?

All the signals of 8085 can be classified into 6 groups

1. Address bus
2. Data bus
3. Control and status signals
4. Power supply and frequency signals
5. Externally initiated signals
6. Serial I/O ports

18. What are operations performed on data in 8085?

The various operations performed are

1. Store 8-bit data
2. Perform arithmetic and logical operations
3. Test for conditions
4. Sequence the execution of instructions
5. Store data temporarily during execution in the defined R/W
6. Memory locations called the stack

19. 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 mamory 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.

20. How many interrupts does 8085 have mention them

The 8085 has 5 interrupt signals they have INTR,RST7.5,RST6.5,RST5.5 and TRAP

21. Basic concepts in the memory interfacing?

The primary function of memory interfacing is that the microprocessor should be able to read from and write into a given register of a memory chip.to perform these operations the microprocessor should,

1. Be able to select the chip
2. Identify the register
- 3.Enable the appropriate buffer

22. 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.

23. 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.

24. How many machine cycles does 8085 have,mention them?

The 8085 have seven machine cycles they are

1. Opcode fetch
2. Memory read
3. Memory write
4. I/O read
5. I/Owrite
6. Interrupt acknowledge
7. Bus idle

25.Explain the signals HOLD,READY and SID

HOLD indicates that a peripheral such a 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 accept or send data.

SID is used to accept serial data bit by bit.

26.What is the use of bidirectional buffer?

It is used to increase the driving capacityof data bus.the data bus of the microcomputer system is bidirectional,so it requires a buffer that allow the data to flow in both directions.

27.Give the register organization of 8085?

Temp reg

Temp reg

W(8)
Register
B(8)
Register
H(8)
Stack pointer(16)
Program counter(16)

Z(8)
register
E(8)
Register
L(8)

28.What is the microcontroller and microcomputer?

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

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

29.Define flags?

The flags are used to reflect the data conditions in the accumulator.the 8085 flags are sign flag,zero flag,auxillary flag,parity flag,CY-CARRY FLAG

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

30. Difference between memory mapped I/O and peripheral I/O ?

MEMORY MAPPEED I/O	PERIPHERAL I/O
16-bit device address	8-bit device address
The data transfer between any general-purpose register and I/O port	The data transfer only between accumulator and I/O port
The memory map(64kb)is shared between I/O device and system memory	The I/O map is independent of the memory map,256 input device and 256 output device
More hardware is required to decode 16-bit address	Less hardware is required to decode 8-bit address

31.What is interfacing?

An interface is a shared boundary between the devices which involves sharing information.interfacing is the process of making two different systems communicate with each other.

32. What is memory mapping?

The assignment of memory address to various registers in a memory chip is called as memory mapping.

32. What is I/O mapping?

The assignment of addresss to varriousI/O devices in the memory chip is called as I/O mapping.

UNIT-2 PROGRAMMING OF 8085 PROCESSOR

TWO MARKS

1. What is an instruction?

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

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

There are 74 operations in the 8085 microprocessor

3. 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.

4. 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.

5. 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.

6. 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.

7. 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)

8. 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
4. Branching JNZ CALL 16-bit
5. Machine control HLT,NOP

9. 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.

10. Explain the different instruction formats with ex?

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

11. What is the use of addressing modes,mention the different types?

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

1. Immediate addressing
2. Register addressing
3. Direct addressing
4. Indirect addressing
5. Implicit addressing

12. 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

13. 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

14. Compare CALL and PUSH instructions

CALL	PUSH
When CALL is executed the microprocessor automatically stores the 16-bit address of the instruction next to CALL on the stack	The program uses the instruction PUSH to save the contents of the register pair on the stack
When CALL is executed the stack pointer is decremented by two	When PUSH is executed the stack pointer register is decremented by two

15. 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.

16. Compare RET and POP

RET	POP
RET transfers the content of the top two locations of the stack to the PC	Pop transfers the content of the top two locations of the stack to the specified register pair
When RET is executed the SP is incremented by two and it has 8 conditional RETURN instructions	When POP is executed the SP is incremented by two and no conditional POP instructions

17. 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.

18. 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 $N=0$.

19. 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

20. Define stack?

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

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 is the minimum s/m and how it is formed in 8085?

A minimum s/m is one which is formed using minimum number of IC chips. the 8085 based minimum s/m is formed using 8155, 8355 & 8755.

UNIT- 3 PERIPHERAL INTERFACING

TWO MARKS

1. What is the use of 8051 chip?

1

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 transreceivers 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 are the various programmed data transfer methods?

- i) Synchronous data transfer
- 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. To transfer 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

Mode 1-Strobe I/O mode

Mode 2- Strobe bi-direction I/O

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)

INTR (Interrupt request)

OBF (Output buffer full)

INTR (Interrupt request)

IBF (Input buffer full)

Output control signal

ACK (Acknowledge input)

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.

1. Display scan
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.

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.

UNIT-IV MICROCONTROLLERS 8051

TWO MARKS

1. What is mean 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. 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.

3. 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

4. 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

5. Specify the single instruction, which clears the most significant bit of B register of 8051, without affecting the remaining bits.

Single instruction, which clears the most significant bit of B register of 8051, without affecting the remaining bits, is CLR B.7.

6. 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.

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

DPTR:

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:

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.

8. 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.

9. 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.

10. Compare Microprocessor and Microcontroller.

Microprocessor	Microcontroller
1. Microprocessor contains ALU, general Purpose register counter, clock timing Circuit and interrupt circuit.	Microcontroller contains the circuitry of microprocessor and in addition it has Built-in ROM, RAM, I/O devices and Counter.
2. It has many instructions to move data between memory and CPU.	It has many instructions to move data between memory and CPU.
3. It has one or two bit handling instruction .	it has many bit handling instructions.
4. Access times for memory and I/O Devices are more.	Less access times for built-in memory and I/O devices.
5. Microprocessor based system requires more hardware	Microcontroller based system requires less hardware reducing PCB size and Increasing the reliability.

11. 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 T

Timers interrupt 1: TF1:001BH

Serial interrupt

Receive interrupt: RI: 0023H

Transmit interrupt: TI: 0023H

12. Write a program to subtract the contents of RI of Bank0 from the contents of R0 of Bank2.

```
MOV PSW, #10
MOV A, R0
MOV PSW, #00
SUBB A, R1
```

13. How the RS-232 serial bus is interrupt to 1TTL logic device?

The RS-232 signal voltage level devices are not compatible with TTL logic levels. Hence for interfacing TTL devices to RS-232 serial bus, level converters are used. The popularly used level converters are MC 1488 & MC 1489 or MAX 232.

14. List some of the features of 8096 microcontroller.

- The 8096 is a 16-bit microcontroller.
- the 8096 is designed to use in application which require high speed calculations and fast I/O operation.

- c. The high speed I/O section of an 8096 includes a 16-bit timer, a 16-bit counter, a 4 input programmable edge detector, 4 software timer and counter 6-output programmable events Generator.
- d. It has 100 instructions, which can operate on bit, byte, word and double words.
- e. The bit operation is possible and these can be performed on any bit in the register file or in the special function register.

15. List the features of 8051 microcontroller?

The features are

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

16. Explain the operating mode 0 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.

17. Explain the operating mode 0 of 8051 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.

For eg: the parity bit (P, in the PSW) could be moved into TB8. On receive the 9th data bit go in to the RS8 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.

18. Explain the mode 3 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, Mode 3 is the same as Mode 2 in all respect except the baud rate. The baud rate in Mode 3 is variable.

In all the four modes, transmission is initiated by any instruction that uses SBUF as a destination register. Reception is initiated in Mode 0 by the condition RI=0 & REN=1. Reception is initiated in other modes by the incoming start bit if REN=1.

19. List the addressing modes of 8051?

Direct addressing
Register addressing
Register indirect addressing
Implicit addressing
Immediate addressing
Index addressing
Bit addressing

UNIT V MICRO CONTROLLER PROGRAMMING & APPLICATIONS

TWO MARKS

1. Write a program using 8051 assembly language to change the data 55h stored in the lower byte of the data pointer register to AAH using rotate instruction?

```
MOV DPL,#55H
MOV A,DPL
RL A
LABEL : SJMP Label
```

2. Explain the contents of the accumulator after the execution of the following program segments?

```
MOV A,#3CH
MOV R4,#66H
ANL A,R4
A 3C
R4 66
A 24
```

3. Write a program to load accumulator a,DPH and DPL with 30H?

```
MOV A,#30
MOV DPH,A
MOV DPL,A
```

4. Write a program to perform multiplication of 2 nos using 8051?

```
MOV A,#data 1
MOV B,#data 2
MUL AB
MOV DPTR,#5000
MOV @DPTR,A(lower value)
INC DPTR
MOV A,B
MOVX@DPTR,A
```

5. Write a program to mask the 0th & 7th bit using 8051?

```
MOV A,#data
ANL A,#81
MOV DPTR,#4500
MOVX @DPTR,A
LOOP SJMP LOOP
```

6. Write about CALL statement in 8051?

There are two subroutine CALL instructions. they are

*LCALL(Long CALL)

*ACALL(Absolute CALL)

Each increments the pc to the 1st byte of the instruction & pushes them in to the stack.

7. Write about the jump statement?

There are three forms of jump.they are
LJMP(Long-jump)-address 16
AJMP(Absolute jump)-address 11
Sjmp(short jump)-relative address

8. Write a program to load accumulator DPH & DPL using 8051?

```
MOV A,#30
MOV DPH,A
MOV DPL,A
```

9. Write a program to find 2's complement using 8051?

```
MOV A,R0
CPL A
INC A
```

10. Write a program to add two 8-bit numbers using 8051?

```
MOV A,#30H
ADD A,#50H
```

11. Write a program to swap two numbers using 8051?

```
MOV A,#data
SWAP A
```

12. Write a program to subtract two 8-bit numbers & exchange the digits using 8051?

```
MOV A,#9F
MOV R0,#40
SUBB A,R0
SWAP A
```

13. Write a program to subtract the contents of R1 of bank 0 from the contents of R0 of bank 2 using 8051?

```
MOV PSW,#10
MOV A,R0
MOV PSW,#00
SUBB A,R1
```

14. Explain the operating mode0 of 8051 serial ports?

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

15. 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 go in to 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.

16. 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 by any instruction that uses SBUF as a destination register.reception is initiated in mode0 by the condition R1=0 & REN=1.reception is initiated in other modes by the incoming start bit if REN=1.

17. What are the tasks involved in keyboard interfacing?

The tasks involved in keyboard interfacing are sensing a keyboard interfacing are sensing a key actuation, de-bouncing the key and generating key codes(decoding the key).these tasks are performed in software if the keyboard is interfaced through ports and they are performed by hardware if the keyboard is interfaced through 8279.

18. How a keyboard matrix is formed in keyboard interface ?

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.

19. 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.

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

In display devices the process of sending display codes to 7-segment LED'S to display the led's one by one is called scanning. The scan time is the time taken to display all the 7-segment LED'S one by one, starting from first LED and coming back to the first LED again.

21. Give some ex of input devices to microprocessor-based systems

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

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Question Paper Code: E3064

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2010

Fourth Semester

Computer Science and Engineering

CS2252 — MICROPROCESSORS AND MICROCONTROLLERS

(Common to Information Technology)

(Regulation 2008)

Time: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A — ($10 \times 2 = 20$ Marks)

1. Assume that the accumulator contains data bytes 82H and the instruction MOV C, A (4FH) is fetched. List the steps in decoding and executing the instruction.
2. What are the second bytes in the instruction IN and OUT of 8085 microprocessor?
3. Draw the 8086 flag register format.
4. List different types of 8086 hardware interrupts.
5. Compare closely coupled configuration with loosely coupled configuration.
6. Mention the need for co-processor in a microprocessor based system.
7. Can an input port and an output port have the same port address? Justify.
8. Why is each channel in DMA controller restricted to 16K bytes of data transfer?
9. With XTAL = 11.0592 MHz, what value should be loaded into TH1 to have 9600 baud rate?
10. How do you select the register bank in 8051 microcontroller?

PART B — ($5 \times 16 = 80$ Marks)

11. (a) (i) Write an 8085 assembly language program with flowchart for the following: Six bytes are stored in memory locations starting at XX50H. Add all the data bytes. Use register B to save any carry generated while adding the data bytes. Store the sum at two consecutive memory locations, XX70H and XX71H. Data (H): A2, FA, DF, E5, 98, 8B. (8)

- (ii) Write a program to generate a continuous square wave with the period of $500\mu s$. Assume the system clock period is $325ns$ and use bit D0 to output the square wave. (8)

Or

- (b) (i) Explain the following 8085 instructions with an example JP, JPO, CM, RPE, DAA, XCHG, SPHL and PCHL. (8)
- (ii) Draw the timing diagram for the instruction MVI A, 32h and OUT 01h. (8)
12. (a) (i) Draw the internal block diagram of 8086 microprocessor and explain. (8)
- (ii) Explain any eight assembler directives of 8086 microprocessor. (8)

Or

- (b) (i) Give three examples for the following 8086 microprocessor instructions: String Instructions, Process Control Instructions, Program Execution Transfer Instructions and Bit Manipulation Instructions. (12)
- (ii) How does one define and Call Macro parameters of 8086 microprocessor? (4)
13. (a) (i) Draw the internal block diagram of 8087 Co-processor and explain it with 8087 control word and status word formats. (12)
- (ii) Give two examples for packed decimal data transfers and integer data transfers of an 8087 Co-processor. (4)

Or

- (b) Draw the architecture of 8089 I/O Co-processor and explain. (16)
14. (a) Draw the block diagram of 8279 Keyboard/Display controller and explain how to interface the Hex Key Pad and 7-segment LEDs using 8279. (16)

Or

- (b) (i) Draw the functional block diagram of 8254 timer and explain the different modes of operation. (8)
- (ii) Draw the block diagram of 8259A and explain how to program 8259A. (8)
15. (a) (i) Explain the memory structure of an 8051 Microcontroller. (8)
- (ii) How does one interface a 16×2 LCD Display using 8051 Microcontroller? (8)

Or

- (b) (i) Explain the on-chip timer modes of an 8051 Microcontroller. (8)
- (ii) Explain how to interface an 8-bit ADC with 8051 Microcontroller. (8)

Reg. No. :

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Question Paper Code : 53100

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2010

Fourth Semester

Computer Science and Engineering

CS 2252 — MICROPROCESSORS AND MICROCONTROLLERS

(Common to Information Technology)

(Regulation 2008)

Time : Three hours

Maximum : 100 Marks

Answer ALL questions

PART A — (10 × 2 = 20 Marks)

1. Give any two single byte instructions that clear the accumulator register of 8085.
2. List the machine cycles involved in the execution of the following 8085 instructions: PUSH PSW; MOV A, M.
3. List the pointer and index registers of 8086 architecture.
4. Identify the addressing modes involved in the following 8086 instructions: MOV AX, 0005H; MOV AX, 50H [BX][SI].
5. What are the two internal sections of 8087 architecture?
6. What is the role of CCP in 8089 architecture?
7. What are the signals and instructions available in 8085 processor for serial I/O communication?
8. What signals are required between a 8085 processor and an interrupt controller for interrupt driven data transfer?
9. What are the functions of the following signals of 8051? ALE/PROG, $\overline{\text{PSEN}}$.
10. What are the sources of interrupts in 8051?

PART B — (5 × 16 = 80 Marks)

11. (a) (i) List and explain the functions of flags in 8085 processor. (8)
(ii) Write an assembly language program using 8085 instruction set to convert a string of ASCII characters into its hexadecimal equivalent. (8)

Or

- (b) (i) Identify the addressing modes and the number of T-states required for the following instructions of 8085: MOV M,A; LXI SP, addr.; LDAX D;ORA B. (8)
(ii) Discuss the features of 8085 processor for the support of interrupts and DMA. (8)

12. (a) (i) Explain the register organization of 8086 processor in detail. (8)
(ii) Describe the various addressing modes of 8086 processor with suitable examples for each. (8)

Or

- (b) (i) What is the use of interrupts in microprocessor systems? With suitable examples explain the sequence of operations done by a microprocessor when it is interrupted. (8)
(ii) Explain how BIOS function calls are invoked in assembly language programs. (8)
13. (a) (i) Explain the exception handling feature of 8087. (8)
(ii) Write a detailed note on the data types supported by 8087 in detail. (8)

Or

- (b) (i) With a neat sketch explain the general interconnections between 8086 and 8089. (10)
(ii) Distinguish between loosely coupled and closely coupled multiprocessor systems with suitable examples. (6)
14. (a) (i) With a neat sketch, show all the interconnections required between a 8085 processor and a RAM of size 4KB mapped in the address range 2000H-2FFFFH. (8)
(ii) Explain the data transfer on a parallel printer interface using a timing diagram. (8)

Or

- (b) (i) What are the signals a microprocessor should have to support DMA? List and explain the sequence of operations carried out during a DMA transfer. (8)
(ii) Explain the four modes of keyboard operation in 8279. (8)
15. (a) (i) Bring out the features of Special Function Registers of 8051 microcontroller. (8)
(ii) With a neat sketch of a Schematic diagram, explain the functions of various signals of 8051. (8)

Or

- (b) (i) Describe the various interrupts and their associated priorities in 8051 microcontroller. (8)
(ii) Write brief notes on ADCs mid DACs along with their interface details. (8)