UNIT I
THE 8085 AND 8086 MICROPROCESSORS

1. What is Microprocessor? Give the power supply & clock frequency of 8085[NOV/DEC 2011]
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 supply 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. 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.

6. What is an Opcode?
The part of the instruction that specifies the operation to be performed is called the operation code or opcode.

7. 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.

8. What is an Operand?
The data on which the operation is to be performed is called as an Operand.

9. How many operations are there in the instruction set of 8085 microprocessor?
There are 74 operations in the 8085 microprocessor.

10. List out the five categories of the 8085 instructions. Give examples of the instructions for each group. .[NOV/DEC 2006]
• Data transfer group – MOV, MVI, LXI.
• Arithmetic group – ADD, SUB, INR.
• Logical group –ANA, XRA, CMP.
• Branch group – JMP, JNZ, CALL.
• Stack I/O and Machine control group – PUSH, POP, IN, HLT.

11. Explain 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.

12. 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.

13. 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 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.

14. List the four instructions which control the interrupt structure of the 8085 [NOV/DEC 2006 APR/MAY 2011]
• DI (Disable Interrupts)
• EI (Enable Interrupts)
• RIM (Read Interrupt Masks)
• SIM (Set Interrupt Masks)

15. What is meant by interrupt?
Interrupt is an external signal that causes a microprocessor to jump to a specific subroutine.

16. Explain priority interrupts of 8085.[MAY/JUNE-2006]
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 bye RST 7.5, RST 6.5, RST 5.5. The priority of interrupts in 8085 is shown in the table.

Interrupts	Priority
TRAP	1
RST 7.5	2
RST 6.5	3
RST 5.5	4
INTR	5

17. What is the signal classification of 8085?
All the signals of 8085 can be classified into 6 groups

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

18. 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

19. How many interrupts does 8085 have, mention them.[MAY/JUNE-2006]

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

20. Define instruction cycle, machine cycle and T-state [may/june 2006][APRIL/MAY2011]

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

21. What is an instruction?

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

22. What is the use of ALE?[Nov/Dec 2003]

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.

23. How many machine cycles does 8085 have, mention them

The 8085 have seven machine cycles. They are
• Opcode fetch
• Memory read
• Memory write
• I/O read
• I/O write
• Interrupt acknowledge
• Bus idle

24. Explain the signals HOLD, READY and SID.(APR/MAY2004)

HOLD indicates that a peripheral such as DMA controller is requesting the use of address bus, data bus and control bus. READY is used to delay the microprocessor read or write cycles until a slow responding peripheral is ready to send or accept data. SID is used to accept serial data bit by bit 33.Mention the categories of instruction and give two examples for each category The instructions of 8085 can be categorized into the following five
• Data transfer MOV Rd, Rs STA 16-bit
• Arithmetic ADD R DCR M
• Logical XRI 8-bit RAR

• Branching JNZ CALL 16-bit
• Machine control HLT NOP

25. Explain the different instruction formats with examples
The instruction set is grouped into the following formats
• One byte instruction MOV C, A
• Two byte instruction MVI A, 39H
• Three byte instruction JMP 2345H

26.What is the use of addressing modes, mention the different types[NOV/DEC 2007]
The various formats of specifying the operands are called addressing modes, it is used to access the operands or data. The different types are as follows
• Immediate addressing
• Register addressing
• Direct addressing
• Indirect addressing
• Implicit addressing

27. What is the use of bi-directional buffers?[APRIL/MAY2003]
It is used to increase the driving capacity of the data bus. The data bus of a microcomputer system is bi-directional, so it requires a buffer that allows the data to flow in both directions.

28. Compare CALL and PUSH instructions CALL PUSH[NOV/DEC 2007]

CALL	PUSH
When CALL is executed the microprocessor automatically stores the 16-bit address of the instruction next to CALL on the stack	The programmer 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

29. Define Flags[APR/MAY2011]
The flags are used to reflect the data conditions in the accumulator. The 8085 flags are S-Sign flag, Z-Zero flag, AC-Auxiliary carry flag, P-Parity flag, CY Carry flag

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

31.List various instructions that can be used to clear accumulator in 8085 microprocessor.[NOV/DEC 2007]

MVI A,00, XRA A, ANI 00H, SUB A

UNIT II
8086 SOFTWARE ASPECTS

1. What is assembler? [APRIL/MAY2008 NOV/DEC 2011,APR/MAY2011]
The assembler translates the assembly language program text which is given as input to the assembler to their binary equivalents known as object code. The time required to translate the assembly code to object code is called access time. The assembler checks for syntax errors & displays them before giving the object code.

2. What is loader?
The loader copies the program into the computer's main memory at load time and begins the program execution at execution time.

3. What is linker? [APRIL/MAY2008]
A linker is a program used to join together several object files into one large object file. For large programs it is more efficient to divide the large program modules into smaller modules. Each module is individually written, tested & debugged. When all the modules work they are linked together to form a large functioning program.

4. Explain ALIGN & ASSUME
The ALIGN directive forces the assembler to align the next segment at an address divisible by specified divisor. The format is ALIGN number where number can be 2, 4, 8 or 16.
Example: ALIGN 8.
The ASSUME directive assigns a logical segment to a physical segment at any given time. It tells the assembler what address will be in the segment registers at execution time.
Example: ASSUME CS: code, DS: data, SS: stack

5. Explain PTR & GROUP
A program may contain several segments of the same type. The GROUP directive collects them under a single name so they can reside in a single segment, usually a data segment. The format is Name GROUP Seg-name. Seg-name PTR is used to assign a specific type to a variable or a label. It is also used to override the declared type of a variable.

6. Explain about MODEL
This directive provides short cuts in defining segments. It initializes memory model before defining any segment. The memory model can be SMALL, MEDIUM, COMPACT or LARGE.

7. Explain PROC & ENDP
PROC directive defines the procedures in the program. The procedure name must be unique. After PROC the term NEAR or FAR are used to specify the type of procedure.
Example: FACT PROC FAR. ENDP is used along with PROC and defines the end of the procedure.

8. Explain SEGMENT & ENDS
An assembly program in .EXE format consists of one or more segments. The starts of these segments are defined by SEGMENT and the end of the segment is indicated by ENDS directive.
Format Name SEGMENT Name ENDS

9. Explain TITLE & TYPE

The TITLE directive helps to control the format of a listing of an assembled program. It causes a title for the program to print on line 2 of each page of the program listing. Maximum 60 characters are allowed. Format TITLE text. TYPE operator tells the assembler to determine the type of specified variable in bytes. For bytes the assembler gives a value 1, for word 2 & double word 4.

10. Define SOP

The segment override prefix allows the programmer to deviate from the default segment
Eg: MOV CS : [BX] , AL

11. Define variable

A variable is an identifier that is associated with the first byte of data item. In assembly language statement: COUNT DB 20H, COUNT is the variable.

12. What are procedures?

Procedures are a group of instructions stored as a separate 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.

13. What are libraries?

Library files are collection of procedures that can be used in other programs. These procedures are assembled and compiled into a library file by the LIB program. The library file is invoked when a program is linked with linker program. When a library file is linked only the required procedures are copied into the program. Use of library files increase s/w reusability & reduce s/w development time.

14. What are Macros?[NOV/DEC 2007,2011]

Macro is a group of instruction. The macro assembler generates the code in the program each time where the macro is called. Macros are defined by MACRO & ENDM directives. Creating macro is similar to creating new opcodes that can be used in the program
INIT MACRO
MOV AX, data
MOV DS
MOV ES, AX
ENDM

15. How do 8086 interrupts occur?

An 8086 interrupt can come from any of the following three sources
External signals, Special instructions in the program & Condition produced by instruction

16. What are the 8086 interrupt types?

Dedicated interrupts
• Type 0: Divide by zero interrupt
• Type 1: Single step interrupt
• Type 2:Non maskable interrupt
• Type 3: Breakpoint

• Type 4: Overflow interrupt
Software interrupts: Type 0-255

17. What is interrupt service routine?[NOV/DEC 20011]
Interrupt means to break the sequence of operation. While the CPU is executing a program an interrupt breaks the normal sequence of execution of instructions & diverts its execution to some other program. This program to which the control is transferred is called the interrupt service routine.

18. Define BIOS
The IBM PC has in its ROM a collection of routines, each of which performs some specific function such as reading a character from keyboard, writing character to CRT. This collection of routines is referred to as Basic Input Output System or BIOS.

19. Explain PUBLIC
For large programs several small modules are linked together. In order that the modules link together correctly any variable name or label referred to in other modules must be declared public in the module where it is defined. The PUBLIC directive is used to tell the assembler that a specified name or label will be accessed from other modules. Format PUBLIC Symbol.

20. Explain DUP
The DUP directive can be used to initialize several locations & to assign values to these locations. Format Name Data_Type Num DUP (value) Example: TABLE DW 10 DUP (0). Reserves an array of 10 words of memory and initializes all 10 words with 0. Array name is TABLE.

21 Compare Procedure & Macro[NOV/DEC 2011]

Procedure	Macro
Accessed by CALL & RET instruction during program execution	Accessed during assembly with name given to macro when defined
Machine code for instruction is put only once in the memory	Machine code is generated for instruction each time when macro is called
With procedures less memory is required	With macro more memory is required
Parameters can be passed in registers, memory locations or stack	Parameters passed as part of statement which calls macro

22. What is the purpose of segment registers in 8086? [APRIL/MAY2008] .[NOV/DEC 2006,2011]
There are 4 segment registers present in 8086. They are
1. Code Segment (CS) register
2. Data Segment (DS) register
3. Stack Segment (SS) register
4. Extra Segment (ES) register
The code segment register gives the address of the current code segment. ie. It will points out here the instructions, to be executed, are stored in the memory.
The data segment register points out where the operands are stored in the memory.

The stack segment registers points out the address of the current stack, which is used to store the temporary results. If the amount of data used is more the Extra segment register points out where the large amount of data is stored in the memory.

23. Define pipelining?[NOV/DEC 2006,NOV/DEC2011]]
In 8086, to speed up the execution of program, the instructions fetching and execution of instructions are overlapped each other. This technique is known as pipelining. In pipelining, when the nth instruction is executed, the n+1 th instruction is fetched and thus the processing speed is increased.

24. Discuss the function of instruction queue in 8086?[NOV/DEC 2006][APR/MAY2011]
In 8086, a 6-byte instruction queue is presented at the Bus Interface Unit (BIU). It is used to prefetch 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.

25. What is the maximum memory size that can be addressed by 8086?[MAY/JUNE 2006]
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.

26. What is the function of the signal in 8086?[MAY/JUNE 2006]
BHE signal means Bus High Enable signal. The BHE signal is made low when there is some read or write operation is carried out. ie . When ever the data bus of the system is busy i.e. whenever there is some data transfer then the BHE signal is made low.

27. What are the predefined interrupts in 8086?
The various predefined interrupts are,
DIVISION BY ZERO (type 0) Interrupt.
SINGLE STEP (type 1) Interrupt.
NONMASKABLE (type2) Interrupt.
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BREAK POINT (type 3) Interrupt.
OVER FLOW (type 4) Interrupt.

28. What are the conditional and control flags available in status register of 8086?[NOV/DEC 2007] [MAY/JUNE 2006] [APRIL/MAY2008]
Conditional Flags:
CF - Carry Flag
PF - Parity Flag
AF - Auxiliary Carry Flag
ZF - Zero Flag SF - Sign Flag
OF - Overflow Flag
Control Flags:
TF – Single step Trap Flag
IF – Interrupt Enable Flag
DF – String Direction Flag

29. Draw the Flag register format of 8086?[APRIL/MAY 2011]

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
U	U	U	U	OF	DF	IF	TF	SF	ZF	U	AF	U	PF	U	CF

CF - Carry Flag PF - Parity Flag AF - Auxiliary Carry Flag ZF - Zero Flag
SF - Sign Flag TF – Single step Trap Flag IF – Interrupt Enable Flag
DF – String Direction Flag OF - Overflow Flag U – Undefined

30. List the various addressing modes present in 8086?[MAY/JUNE 2007]
There are 12 addressing modes present in 8086. They are,
  (a) Register and immediate addressing modes
        Register addressing modes
        Immediate addressing mode
  (b) Memory addressing modes.
        Direct addressing modes
        Register indirect addressing modes
        Based addressing modes
        Indexed addressing modes
        Based Indexed addressing modes
        String addressing modes
  (c) I/O addressing modes
        Direct addressing mode
        Indirect addressing mode
  (d) Relative addressing mode
  (e) Implied addressing mode

31. State the significance of LOCK signal in 8086?
If 8086 is working at maximum mode, there are multiprocessors are present. If the system bus is given to a processor then the LOCK signal is made low. That means the system bus is busy and it cannot be given of any other processors. After the use of the system bus again the LOCK signal is made high. That means it is ready to give the system bus to any processor.

32. What are the functions of bus interface unit (BIU) in 8086?
(a) Fetch instructions from memory.
(b) Fetch data from memory and I/O ports.
(c) Write data to memory and I/O ports.
(d) To communicate with outside world.
(e) Provide external bus operations and bus control signals.

33. What is the clock frequency of 8086?
8086 8086-2 8086-4
Internal clock Frequency 5 MHz 8MHz 4MHz
External Clock Frequency 15MHZ 24MHZ 12MHZ

34. What are the two modes of operations present in 8086?[may/june2007]
i. Minimum mode (or) Uniprocessor system ii. Maximum mode (or) Multiprocessor system

35. What are the functions of status pins in 8086?

S2 S1 S0

0   0   0 ---- Interrupt acknowledge
0   0   1 ---- Read I/O
0   1   0 ---- Write I/O
0   1   1 ---- Halt
1   0   0 ---- Code access
1   0   1 ---- Read memory
1   1   0 ---- Write memory
1   1   1 ---- inactive

S4 S3

0   0 --I/O from extra segment
0   1 --I/O from Stack Segment
1   0 --I/O from Code segment
1   1 --I/O from Data segment

S5 --Status of interrupt enable flag
S6 --Hold acknowledge for system bus
S7 --Address transfer.

36. What are the three classifications of 8086 interrupts?[MAY/JUNE-2006]

(1) Predefined interrupts, (2) User defined Hardware interrupts, (3) User defined software interrupts.

37. What are the differences between maximum mode and minimum mode[NOV/DEC 2003]

Minimum mode

1 A processor is in minimum mode when MN /MX pin is strapped to +5v
2. All control signals are given out by. microprocessor chip it self
3. There is a single micro processor

Maximum mode

1.A processor is in maximum mode when MN /MX is grounded
2.The processor derive the status signals S2, Sl and So. Another chip called bus controller derives control signals using this status information
3. There may be more than one microprocessor

UNIT III
MULTIPROCESSOR CONFIGURATIONS

1. What are the advantages of multiprocessor system?
• High level performance can be attained when parallel processing.
• Robustness can be improved by isolating system functions.

2. What are the problems occurred in multiprocessor system?
1. Bus contention
2. Inter process communication
3. Resource sharing

3. What is Coprocessor?[NOV/DEC 2007] [APR/MAY2011]
The coprocessor is a processor which specially designed for processor to work under the control of the processor and support special processing capabilities. Example : 8087 which has numeric processing capability and works under 8086.

4. What are the basic multiprocessor configurations?
1. Coprocessor configuration
2. Closely Coupled configuration
3. Loosely coupled configuration

5. Compare closely coupled and loosely coupled configurations.[NOV/DEC 2011]

Closely coupled	Loosely coupled
1. Single CPU is used	1. Multiple CPU modules are used
2. It has local bus only	2. It has local as well system bus
3. No system memory or IO	3. It has system memory and IO, shared
4. No bus arbitration logic required among CPU modules	4. Bus arbitration logic required

6. Write the advantages of loosely coupled system over tightly coupled systems?
1. More number of CPUs can be added in a loosely coupled system to improve the system performance
2. The system structure is modular and hence easy to maintain and troubleshoot.
3. A fault in a single module does not lead to a complete system breakdown.

7. What are the features of 8087?
It can operate on the data of integer, decimal and real types with lengths ranging from 2 to 10 bytes. It is high performance numeric data processor. It can multiply two 16-bit real numbers in about 27us and calculate square root in about 36us. It is multi-bus compatible.

8. Write about status bits of 8087.

S2 S1 S0 STATUS
0 X X unused
1 0 0 unused
1 0 1 READ memory
1 1 0 WRITE memory
1 1 1 Passive

9. Write a short note on data register in 8087.
1. It has 8 data register.
2. Each register is 8 bit and accessed as a stack
3. A PUSH operation decrements the TOP of the stack by one and loads the value on the top register.
4. A POP register stores the value from the current TOP register and increments TOP by one.

10. Write a short note on status register in 8087.
1. Status register is 16 bit register.
2. It indicates various errors, stores condition code for certain instruction and indicates the BUSY status.

11. Write a short note on TAG register in 8087.
TAG register holds the status of the contents of the data register.
00 - Data valid
01 - Zero
10 - A special value
11 – Empty

12. List the data types of 8087.
• Word integer
• Short integer
• Long integer
• Packed BCD
• Short real
• Long real
• Temporary real

13. What are the features of 8089 I/O processor?
• An IOP can fetch and execute its own instruction.
• IOP can transfer data from an 8 bit source to 16 bit destination and vice versa.
• Communication between IOP and CPU is through memory based control blocks.
• CPU defines tasks in the control blocks to locate a program seguence, called a channel program.

UNIT IV
I/O INTERFACING

1. What are the basic modes of operation of 8255?[APRIL/MAY2008]
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 8 255, So as to support different types of applications, viz. mode 0, mode 1 and mode 2.
Mode 0 - Basic I/O mode
Mode 1 - Strobed I/O mode
Mode 2 - Strobed bi-directional I/O

2. 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.

3. What are the features used mode 1 in 8255?
Two groups – group A and group B are available for strobed 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 lines PC6, PC7 may be used as independent data lines.

4. What are the features used mode 2 in 8255?
The single 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 outputs 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.

5. What are the modes of operations 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)

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

There are two types of write operations 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 initializes the counters, as required. The control word register contents are used for

(a) Initializing the operating modes (mode 0-mode4)

(b) Selection of counters (counter 0- counter 2)

(c) Choosing 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.

7. Give the different types of command words used in 8259?

The command words of 8259A are classified in two groups

1. Initialization command words (ICWs)

2. Operation command words (OCWs)

8. Give the operating modes of 8259a?

(a) Fully Nested Mode

(b) End of Interrupt (EOI)

(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

9. Define scan counter?[NOV/DEC2011]

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 bits and provides a decoded 1 out of 4 scan on SL0-SL3.The keyboard and display both are in the same mode at a time.

10. What is the output modes used in 8279?

8279 provides two output modes for selecting the display options.

1. Display Scan

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.

2. 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.

11. 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. Sensor Matrix Mode.

12. 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.

13. 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.

14. 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.

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

The data transmission between two points involves unidirectional or bi-directional transmission of meaningful digital data through a medium. There are basically there 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 pace in either direction, but at a time data 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 the computer is receiver). However, it is not possible to transmit data from the computer to terminal and from terminal to the computer simultaneously.

16. What are the various programmed data transfer methods?

i) Synchronous data transfer
ii) Asynchronous data transfer
iii) Interrupt driven data transfer

17. 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 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.

18. What is asynchronous data transfer?

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

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

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/receive, error reset and modem control.

20. Give the register organization of 8257?

The 8257 perform the DMA operation over four independent DMA channels. Each of the four channels of 8257 has a pair of two 16-bit registers. DMA address register and terminal count register. Also, there are two common registers for all the channels; namely, mode set registers and status register. Thus there are a total of ten registers. The CPU selects one of these ten registers using address lines A0- A3.

21. What is the function of DMA address register?

Each DMA channel has one DMA address register. The function of this register is to store the address of the starting memory location, which will be accessed by the DMA channel. Thus the starting address of the memory block that will be accessed by the device is first loaded in the DMA address register of the channel. Naturally, the device that wants to transfer data over a DMA channel, will access the block of memory with the starting address stored in the DMA Address Register.

22. What is the use of terminal count register?

Each of the four DMA channels of 8257 has one terminal count register. This 16-bit register is used for ascertaining that the data transfer through a DMA channel ceases or stops after the required number of DMA cycles.

23. What is the function of mode set register in 8257?

The mode set register is used for programming the 8257 as per the requirements of the system. The function of the mode set register is to enable the DMA channels individually and also to set the various modes of operation.

24. Distinguish between the memories mapped I/O peripheral I/O?

SL: NO	Memory Mapped I/O	Peripheral I/O
1	16-bit device address	8-bit device address
2	Data transfer between any general-purpose register and I/O port.	Data is transfer only between accumulator and I.O port
3	The memory map (64K) 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 can be connected
4	More hardware is required to decode 16-bit address	Less hardware is required to decode 8-bit address
5	Arithmetic or logic operation can be directly performed with I/O data	Arithmetic or logical operation cannot be directly performed with I/O data

25. List the operation modes of 8255
a) I.O Mode
i. Mode 0-Simple Input/Output.
ii. Mode 1-Strobed Input/Output (Handshake mode)
iii. Mode 2-Strobed bidirectional mode
b) Bit Set/Reset Mode.

26. 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.

27. What is the purpose of control word written to control register in 8255?[APRIL/MAY2011]
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 function of the BSR function.

28. What is the size of ports in 8255?
Port-A: 8-bits
Port-B: 8-bits
Port-CU: 4-bits
Port-CL: 4-bits

29. 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 communicates with each other.

30. What is memory mapping?[NOV/DEC 2007]
The assignment of memory addresses to various registers in a memory chip is called as memory mapping.

31. What is I/O mapping? [NOV/DEC 2007]

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

32. What is an USART?[NOV/DEC 2007]
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.

33. What is the use of 8251 chip?
8251 chip is mainly used as the asynchronous serial interface between the processor and the external equipment.

34. The 8279 is a programmable _____ interface.
Keyboard/Display

35. List the major components of the keyboard/Display interface.
a. Keyboard section
b. Scan section
c. Display section
d. CPU interface section

36. What is Key bouncing?
Mechanical switches are used as keys in most of the keyboards. 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.

37. Basic concepts in 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
• Be able to select the chip
• Identify the register
• Enable the appropriate buffer

38. Define HRQ?
The hold request output requests 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.

39. What is the use of stepper motor?
A stepper motor is a device used to obtain an accurate position control of rotating shafts. A stepper motor employs rotation of its shaft in terms of steps, rather than continuous rotation as in case of AC or DC motor.

40. What is TXD?
TXD- Transmitter Data Output

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

41. What is RXD?
RXD- Receive Data Input
This input pin of 8251A receives a composite stream of the data to be received by 8251A.

42. How many address lines in a 4096 x 8 EPROM CHIP?
12 address lines.

43. Control signals used for DMA operation are _____
HOLD & HLDA.

44. Differentiate between absolute and linear select decoding?

Absolute decoding	Linear decoding
All higher address lines are defined to select the memory or I/O device	Few higher address lines are decoded to select the memory or I/O device
More h/w is required to design decoding logic	Hardware required to design decoding logic is less
Higher cost for decoding circuit	Less cost for decoding circuit
No multiple address	Has a disadvantage of multiple addressing
Used in large systems	Used in small systems

UNIT V
MICROCONTROLLERS

1. What is mean by microcontroller?[APR/MAY2011]

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

2. List the features of 8051 microcontroller?[may/june 2007][NOV/DEC 2007,2011]

The features are

*single_supply +5 volt operation using HMOS technology.

*4096 bytes program memory on chip(not on 8031)

*128 data memory on chip.

*Four register banks.

*Two multiple mode,16-bit timer/counter.

*Extensive Boolean processing capabilities.

*64 KB external RAM size

*32 bi-directional individually addressable I/O lines.

*8 bit CPU optimized for control applications.

3. What are the addressing modes supported by 8051? [APRIL/MAY2008,NOV/DEC 2011]

• Register addressing

• Direct byte addressing

• Register indirect

• Immediate

• Register specific

• index

4. State the function of RS1 and RS0 bits in the flag register of Intel 8051 microcontroller?[NOV/DEC 2011]

RS1 RS0 Bank Selection

0 0 Bank 0

0 1 Bank 1

1 0 Bank 2

1 1 Bank 3

RS, RS0 – Register bank select bits

5.Give the alternate functions for the port pins of port3?[APR/MAY 2011]

RD WR T1 T0 INT1 INT0 TXD RXD

RD – Read data control output.

WR – Write data control output.

T1 – Timer / Counter1 external input or test pin.

T0 – Timer / Counter0 external input or test pin.

INT1- 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.

6. Explain the function of the EA pin of 8051.

EA: EA stands for external access. When the EA pin is connected to Vcc, program fetched to addresses 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 of 8051.[MAY/JUNE 2007]

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 register or as two independent 8-bit registers. It serves as a base register in indirect jumps, lookup table instructions and external data transfer.

8. Explain the function of the SP pin of 8051.[NOV/DEC-2011]

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 on-chip RAM. The stack pointer is initialised to 07H after a reset. This causes the stack to begin at location 08H.

9. Name the special functions registers available in 8051.[MAY/JUNE 2007]

• 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.

10. What is Microcontroller and Microcomputer?[APRIL/MAY 2011]

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.

11. 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.
Microprocessor And Microcontroller
SCT-DEPARTMENT OF ECE
EX1- Enable external interrupt1 control bit.
ET0 – Enable Timer0 control bit.
EX0- Enable external interrupt0 control bit.

12. Compare Microprocessor and Microcontroller.[NOV/DEC 2006,2011]

Sl.No	Microprocessor	Microcontroller
1	Microprocessor contains ALU, general purpose registers, stack pointer, program counter, clock timing circuit and interrupt circuit.	Microcontroller contains the circuitry of microprocessor and in addition it has builtin ROM, RAM, I/O devices, timers and counters.
2	It has many instructions to move data between memory and CPU. It has one or two instructions to move data between memory and CPU.	It has one or two bit handling instructions. It has many bit handling instructions.
3	Access times for memory and I/O devices are more.	Less access time for built-in memory and I/O devices.
4	Microprocessor based system requires more hardware.	Microcontroller based system requires less hardware reducing PCB size and increasing the reliability.

13. Name the five interrupt sources of 8051?[MAY/JUNE2007] [APRIL/MAY2008]
The interrupts are:
Vector address
• External interrupt 0: IE0: 0003H
• Timer interrupt 0: TF0: 000BH
• External interrupt 1: IE1: 0013H
• Timer Interrupt 1: TF1: 001BH
• Serial Interrupt
Receive interrupt: RI: 0023H
Transmit interrupt: TI: 0023H

14. 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

15. How is stack implemented in 8051?
• The 8051 LIFO: Stack can reside anywhere in the internal RAM.
• It has 8 bit stack pointer to indicate the top of the stack using PUSH and POP instructions.
• During PUSH the SP is incremented by one and POP the SP is decremented by one.

16. List the 8051 instructions that affect the overflow flag.
ADD, ADDC, DIV, MUL, SUBB

17. List the 8051 instructions that always clear the carry flag.
CLR C, DIV, MUL

18. List the 8051 instructions that affect all the flags.[NOV/DEC 2007]
ADD, ADDC and SUBB

19.What are the different types of ADC?[APR/MAY2008 NOV/DEC 2011]
The different types of ADC are successive approximation ADC, counter type ADC flash type ADC, integrator converters and voltageto- frequency converters.