

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

Unit I

1. What do you mean by a processor?

A **processor** can be defined as a system or a circuit, which as per given command or instruction to it, can perform a process.

A **digital processor** is a system of the circuits, which as per given command or instruction to it, does the following exemplary processes.

1. It performs a logical operation between two words.
2. It performs on two words, an addition or subtraction, multiplication or division or comparison
3. It performs on a binary number or on an input, conversion from one form to another or increment or decrement or transfer from a source to a destination.
4. A program control task, say, halts, jump to another set of instructions, call another program, function or set of instructions.

2. Define a Microprocessor.

A **microprocessor** is a single VLSI (Very Large Scale Integrated Circuit) on a single chip that has a CPU and may also have some other parts of a digital processor system.

In other Words,

“Microprocessor is a programmable electronic device that controls interpretation and execution of the instructions and is called as CPU of the computer”

3. What do you mean by a Micro processing unit?

A **Micro Processing Unit** is defined as a device or group of device as a unit that can communicate with peripherals, provide timing signals, direct data flow and perform computing tasks as specified by the instructions in memory.

The unit will have necessary lines for the address bus, the data bus, and the control signals and would require only a power supply and a crystal to be completely functional.

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

4. Give a brief Overview of 8-bit microprocessors

Manufacturer	Part Number
Fair Child	F-8
Intel	8080
MOS Technology	6502
Motorola	MC6800
National Semiconductor	IMP-8
Rockwell International	PPS – 8
Zilog	Z-8
Intel	8085
Zilog	Z-80

} Last 8-bit microprocessors

5. What are the functional units of 8085?

The various functional blocks are:

- a) Registers
- b) Arithmetic and Logic Unit
- c) Instruction decoder and machine cycle encoder
- d) Address buffer
- e) Address/ Data buffer
- f) Incrementor / Decrementor address latch
- g) Interrupt control
- h) Serial I/O control
- i) Timing and control Circuit

6. What are the Registers available in 8085?

It has eight addressable 8-bit registers: A, B, C, D, E, H, L, F and two 16-bit registers PC and SP. These registers can be classified as:

- a. General Purpose Registers
- b. Temporary Registers
 - a) Temporary Data Register b) W and Z registers
- c. Special Purpose Registers
 - b) Accumulator b) Flag Registers c) Instruction Register
- d. Sixteen bit Registers

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

a) Program Counter (PC) b) Stack Pointer (SP)

7. Write a short note on 8085 General Purpose Registers.

B, C, D, E, H and L are 8-bit general-purpose registers that can be used as separate 8-bit registers or as 16-bit register pairs BC, DE, and HL. When used in register pair mode, the high order byte resides in the first register and the low order byte in the second. HL pair also functions as a data pointer or memory pointer. These are also called scratchpad registers, as user can store data in them. To store and read data from these registers, bus access is not required as it is an internal operation.

8. What is the use of Temporary Registers?

a. Temporary Data register: The ALU has two inputs, one from the accumulator and other from temporary data register. The programmer cannot access this temporary data register. b. W and Z registers: They are used to hold 8-bit data during execution of some instructions and are not available for the programmer.

9. What is the use of W and Z registers?

Use of W and Z registers

- 1) The CALL instruction is used to transfer program control to a subprogram or subroutine. This instruction pushes the current PC contents onto the stack and loads the given address into the PC. The given address is temporarily stored in the W and Z registers and placed on the bus for the fetch cycle. Thus the program control is transferred to the address given in the instruction.
- 2) XCHG instruction exchanges the contents of H with D and L with E. At the time of exchange W and Z registers are used for temporary storage of data.

10. What are the Special Purpose Registers in 8085?

Accumulator (Register A), Flag Register Program Counter, Stack Pointer

11. Write the format and fields of 8085 flag Register

(Or)

12. What are the flags in 8085 flag register?

8085 flag register is an 8-bit register, in which five of the bits carry significant information in the form of flags:

S	Z	AC	P	CY
---	---	----	---	----

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

13. What is the use of Sign Flag in 8085?

S-Sign Flag: After the execution of arithmetic or logical operations, if bit D7 of the result is 1, the sign flag is set. In a given byte if D7 is 1, the number is viewed as negative number. If D7 is 0, it will be considered as positive number.

15. What is the use of Zero Flag?

Z-Zero Flag: The zero flag sets if the result of operation in ALU is zero and flag resets if result is non-zero. The zero flag is also set if a certain register content becomes zero following an increment or decrement operation of that register.

16. What is the use of Auxiliary Carry Flag?

AC- Auxiliary Carry Flag: This flag is set if there is an overflow out of bit 3 i.e., carry from lower nibble to higher nibble. This flag is used for BCD operations and it is not available for the programmer.

17. What is the use of Parity Flag?

P-Parity Flag: the number of ones present in the accumulator defines Parity. After an arithmetic or logical operation if the result has an even number of ones i.e., even parity, the flag is set. If the parity is odd, flag is reset.

18. What is the use of Carry Flag?

CY-Carry Flag: This flag is set if there is an overflow out of bit 7. The carry flag also serves as a borrow flag for subtraction.

19. What is the use of Program Counter?

Program Counter (PC): It acts as a pointer to the next instruction; for one byte instruction it increments program counter by one, for two byte instruction it increments program counter by two and for three byte instruction it increments the program counter by three such that program counter always points to the address of the next instruction.

In case of JUMP and CALL instructions, address followed by JUMP and CALL instructions is placed in the program counter. The processor then fetches the next instruction from the new address specified by the JUMP or CALL instruction.

20. What is the use of Stack pointer? How will you load the SP register with a specified address?

Stack Pointer: It holds the address of the most recent stack entry. SPHL will load the contents of HL register into SP

SRI SAI RAM ENGINEERIG COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

21. What is the significance of Arithmetic Logic Unit?

8085's ALU performs arithmetic and logical functions on eight bit variables. The arithmetic unit performs bitwise fundamental arithmetic operations such as addition and subtraction. The logic unit performs logical operations such as complement, AND, OR and EX-OR, as well as rotate and clear. The ALU also looks after the branching decisions.

22. What is the use of Instruction Decoder in a microprocessor?

It decodes the instruction and accordingly gives the timing and control signals which control the register, the data buffers, ALU and external peripheral signals depending on the nature of the instruction.

23. What is the use of Address buffer and Address and Data buffer?

Address Buffer: It is an 8-bit unidirectional buffer. It is used to drive external high order address bus. It is also used to tri-state the high order address bus under certain conditions such as reset, hold, halt and when address lines are not in use.

Address/ Data Buffer

It is an 8-bit bi-directional buffer. It is used to drive multiplexed address/data bus i.e., low order address bus (A7- A0) and Data bus (D7- D0). It is also used to tri-state the multiplexed address/data bus under certain conditions such as reset, hold, halt and when the bus is not in use.

The address and data buffers are used to drive external address and data buses respectively. Due to these buffers the address and data buses can be tri-stated when they are not in use.

24. What is the significance of Incrementer / Decrementer Address Latch?

This 16-bit register is used to increment or decrement the contents of program counter or stack pointer as a part of execution of instructions related to them.

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

25. What are the interrupts available in 8085?

8085 five interrupt inputs RST 5.5, RST 6.5, RST 7.5, TRAP and INTR and one acknowledge signal INTA.

26. What are the pins that control Serial I/O in 8085?

It provides two lines, SOD (Serial Output Data) and SID (Serial Input Data) for sending output data and receiving input data serially.

27. What is the function of Timing and Control Circuitry in 8085?

The control circuitry in the 8085 processor is responsible for all operations. The control circuitry and its operations are synchronized with the help of a clock. The operations are

1. Control of fetching and decoding operations
2. Generating appropriate signals for instruction execution and
3. Generating signals required for interfacing external devices to the processor.

28. What are the Pin classifications in 8085?

The signals of 8085 can be classified into seven groups according to their functions

- a) Power Supply and frequency signals
- b) Data bus and address bus
- c) Control and status bus
- d) Externally initiated signals
 - 1) Interrupt signals
 - 2) DMA signals
 - 3) Reset Signals
- e) Serial I/O signals

29. Write a short note on Power Supply and Frequency Signals.

- i. Vcc – Power Supply
- ii. Vss – Ground reference
- iii. X1 and X2 are connected to crystal which is used for generating Clock signals
- iv. CLK OUT- is used as a system clock for other devices. Its frequency is half the oscillator frequency.

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

30. Write a short note on Data and Address Buses in 8085?

- a) AD0 to AD7 – The 8-bit data bus (D0 - D7) is multiplexed with the lower half (A0 - A7) of the 16-bit address bus. During first part of the machine cycle (T1) lower 8 bits of memory address or I/O address appears on the bus. During remaining part of the machine cycle (T2 and T3) these lines are used as a bi-directional data bus.
- b) A8 - A15 contains the upper half of the address (MSB 8-bits) and they are unidirectional.

31. What are the Control And Status Signals available in 8085?

- a) Address Latch Enable (ALE) enables the address latches so that the lower half of an address is stored in the latches so that it is available throughout the machine cycle.
- b) \overline{RD} and \overline{WR} are basically used to control the direction of the data flow between processor and memory or I/O device/port.
- c) IO/M indicates whether I/O operation or memory operation is being carried out S0 and S1 indicates the type of machine cycle in progress.
- d) Ready: is used by the microprocessor to sense whether a peripheral is ready or not for data transfer, if not, the processor waits. It is thus used to synchronize slower peripherals to the microprocessor.

32. Write a short note on Interrupt Signals in 8085

The 8085 has five hardware interrupt signals: RST 5.5, RST 6.5, RST 7.5, TRAP and INTR. The microprocessor recognizes interrupt requests on these lines at the end of the current instruction execution. The \overline{INTA} (Interrupt Acknowledge) signal is used to indicate that the processor has acknowledged an INTR interrupt.

33. What are the Serial I/O signals in 8085?

- a) SID (Serial Input Data): is used to accept serial data bit by bit from the external device
- b) SOD (Serial Output Data): is an output signal, which enables the transmission of serial data bit by bit to the external device.

34. What are the Signals that facilitate DMA in 8085?

- a) HOLD: indicates that another master is requesting for the use of address bus, data bus and control bus.
- b) HLDA: is used to acknowledge HOLD request.

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

RESET signals

35. How is a 8085 processor set? What happens when a 8085 processor is set? RESET IN: A low on this pin

- a) Sets the program counter to zero (0000H)
- b) Resets the interrupt enable and HLDA flip-flops
- c) Tri-states the data bus, address bus and control bus.
- d) Affects the contents of processors internal registers randomly.

On reset, the PC sets to 0000H, which causes the 8085 to execute the first instruction from address 0000H. For proper reset operation, reset signal must be held low for at least 3 clock cycles. The power-on reset circuit can be used to ensure execution of first instruction from address 0000H.

36. What is the use of RESET OUT signal in 8085?

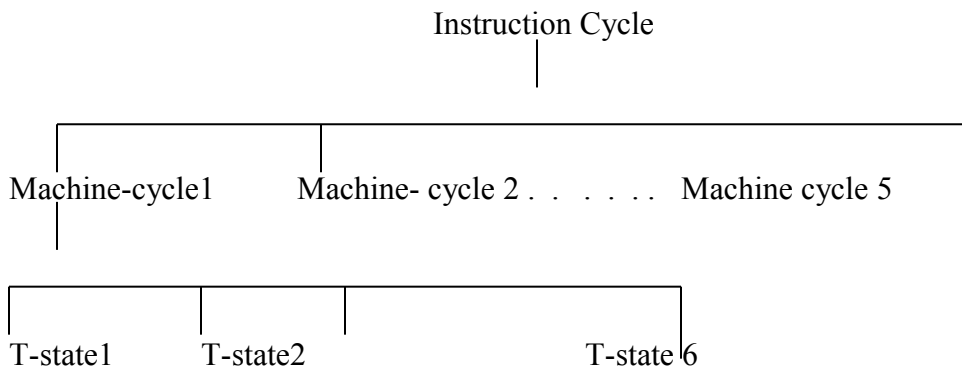
This indicates that processor is being reset. This signal is synchronized to the processor clock and it can be used to reset other devices connected in the system.

37. What do you mean by Instruction Cycles, Machine Cycles and T-states?

The fetching, decoding and execution of a single instruction constitutes an instruction cycle, which consists of one to five read, or write operations between processor and memory or input/output devices.

The time needed to move byte of data in or out of microprocessor is called as a machine cycle.

Each machine cycle consists of 3 to 6 clock periods/ cycles referred to as T-states.



37. What are the various machine cycles available in 8085?

The 8085 machine cycles:

SRI SAI RAM ENGINEERIG COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

- Opcode Fetch
- Memory Read
- Memory Write
- I/O Read
- I/O Write
- Interrupt acknowledge
- Bus Idle

38. What are the registers that form the 8085-programming Model?

Accumulator	Status Register
Register B	Register C
Register D	Register E
Register H	Register L
Stack Pointer (SP)	
Program Counter (PC)	

39. What are the ways in which instructions are classified in 8085?

- Data Transfer Instructions
- Arithmetic Instructions
- Logical Instructions
- Processor Control Instructions
- Branching Instructions
- Stack Manipulation Instructions

40. What is the use of LXI, XCHG instruction in 8085?

- LXI rp, data (16-bit) Load (EXtended) Immediate data to the specified register pair
- XCHG – Exchange the contents of H with D and L with E

41. What is the use of SHLD and LHLD instructions?

SHLD addr - Store the HL register pair's contents in the specified memory location

LHLD addr- Load the HL register pair with the contents of specified memory location

42. What is the use of STAX and LDAX instructions?

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

STAX rp – Store the accumulator's contents specified in the address specified by the register pair

LDAX rp – Load the accumulator with the contents of the address specified by the register pair

43. What is the use of DAD instruction?

DAD rp – Add register pair rp to HL register pair and the result is stored back in HL register pair. No other flags are affected except Carry flag.

44. Write the working of DAA.

DAA instruction adjusts accumulator to packed BCD after adding two BCD numbers. Instruction works as follows:

- If the value of the low-order four bits in the accumulator is greater than 9 or if auxiliary carry flag is set, the instruction adds 6 to the low-order four bits.
- If the value of the high-order four bits in the accumulator is greater than 9 or if carry flag is set, the instruction adds 6(60) to the high-order four bits.

45. What is the use of Increment and Decrement registers in 8085?

- INR r – Increment specified register
- INR M- increment data in memory
- INX rp –(increment eXtended) Increment specified register pair
- DCR r – Decrement specified register
- DCR M – Decrement data in memory
- DCX rp – Decrement (eXtended) specified register pair

46. What are the conditional and unconditional branching instructions in 8085?

SRI SAI RAM ENGINEERIG COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

Branch Operations

a. Jump Instructions

- i. JMP addr – Jump unconditionally to the address
- ii. Jcondition addr – Jump conditionally to the address
- iii. PCHL – Load HL contents into program counter

b. Unconditional CALL and Return instructions

i. CALL addr – call unconditionally a subroutine whose starting address is given within the instruction. It pushes the current PC contents onto the stack and loads the given address into the PC.

- ii. RET- Return from the subroutine unconditionally

c. Conditional Call and return instructions

Conditions for Call

Instruction Code	Description	Condition for CALL
CC	Call on Carry	CY = 1
CNC	Call on Not Carry	CY = 0
CP	Call on Positive	S = 0
CM	Call on Minus	S = 1
CPE	Call on Parity Even	P = 1
CPO	Call on Parity Odd	P = 0
CZ	Call on Zero	Z = 1
CNZ	Call on Not Zero	Z = 0

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

Conditions for return

Instruction Code	Description	Condition for CALL
RC	Return on Carry	CY = 1
RNC	Return on Not Carry	CY = 0
RP	Return on Positive	S = 0
RM	Return on Minus	S = 1
RPE	Return on Parity Even	P = 1
RPO	Return on Parity Odd	P = 0
RZ	Return on Zero	Z = 1
RNZ	Return on Not Zero	Z = 0

47. How will you initialize SP in 8085?

LXI SP, Data – Load eXtended Immediate Data to SP }
 SPHL – Move data from HL to Stack Pointer (SP) } Initializes SP

Direct Way – LXI SP, data (16)

Indirect way – LXI H, data (16)

SPHL

48. Explain the working of Push Operation in 8085 stack.

During Push Operation, 16-bit data is stored on the stack. First, Stack Pointer is decremented by one and then the higher byte of the 16-bit data is stored at the memory location pointed by SP. Second, SP is again decremented by one and then the lower byte of the 16-bit data is stored at the memory location pointed by stack pointer.

PUSH rp – Stores the contents specified register pair on the stack

PUSH PSW – Stores the contents of Program Status Word and accumulator on the stack

49. Explain the working of POP operation in 8085 stack.

POP Operation- In Pop Operation, 16-bit data is read in two operations. In the first operation, the contents from the memory location pointed by SP are loaded into lower byte of register pair and then the stack pointer is incremented by one. In the second operation, the contents from the memory location pointed by stack pointer are loaded into higher byte of register pair and then the stack pointer is incremented by one.

POP rp – loads specified register pair with 16-bit data from the stack

POP PSW – Loads program status word and accumulator with 16-bit from the stack.

50. Write about RST instruction in 8085?

}

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

Restart: RST n – Restart n (0 to 7) – Transfers the program control to the specific memory address as shown.

Instruction Code	Vector Addresses
RST 0	0 X 8 = 0000H
RST 1	1 X 8 = 0008H
RST 2	2 X 8 = 0010H
RST 3	3 X 8 = 0018H
RST 4	1 X 8 = 0020H
RST 5	1 X 8 = 0028H
RST 6	1 X 8 = 0030H
RST 7	1 X 8 = 0038H

51. What are the machine control instructions in 8085?

RST – RST instructions

EI – Enable Interrupt

DI – Disable Interrupt

NOP – No Operation

HLT – Halts the processor

SIM – Set Interrupt Mask

RIM – Read Interrupt Mask – copies the status of the interrupts into the accumulator.

52. What are the Input/Output Operations in 8085?

IN addr (8-bit) – copy data from input port into accumulator

OUT addr (8-bit) – send data to the output port

XTHL – Exchange top of stack with H and L

SPHL – Move data from HL to stack pointer

53. What are the Addressing Modes in 8085?

- ✓ Immediate – 8 or 16-bit data can be specified as a part of the instruction.
- ✓ Register Addressing Mode – specifies the source operand, destination operand, or both to be contained in an 8085 registers.
- ✓ Direct addressing mode – specifies the 16 bit address of the operand within the instruction itself. The second and third bytes of instruction contain this 16-bit address.

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

- ✓ Indirect Addressing mode- the memory address where the operand located is specified by the contents of a register pair
- ✓ Implied addressing mode – Opcode specifies the address of the operands

54. What is the maximum memory of that a microprocessor can access?

Microprocessor 8085 can access 64 Kbytes memory since address bus is 16-bit. But it is not always necessary to use full 64 Kbytes address space. The total memory size depends upon the application. Generally EPROM is used as a program memory and RAM (or RAM) as a data memory. When both, EPROM and RAM are used, they share the total address space 64 Kbytes.

55. What do you mean by Input/ Output Interfacing?

The transfer of data between keyboard and microprocessor, and microprocessor and display device is called input/output data transfer or I/O data transfer. This data transfer is done with the help of I/O ports

Input Port:

It is used to read data from the input device such as keyboard. The simplest form is a tri-state buffer.

Output Port:

It is used to send data to the output device such as display from the microprocessor. The simplest form of output port is a latch.

56. How does 8085 achieve I/O Mapped I/O and Memory Mapped I/O?

I/O Mapped I/O:

Here the 8085 uses $\overline{IO/\overline{M}}$ signal to distinguish between I/O read/write and memory read/write operations. It uses IN and OUT instructions for data transfer.

Memory Mapped I/O:

In this method, I/O devices are assigned and identified by 16 bit addresses. The memory related instructions transfer the data between an I/O device and the microprocessor, as long as I/O port is assigned to the memory address space rather than the I/O address space. The register associated with the I/O port is simply treated as a memory location. Thus I/O device becomes a part of the system's memory map.

57. What are the various I/O transfer Techniques used by 8085?

- a) Program Controlled I/O or Polling control
- b) Interrupt program controlled I/O or Interrupt Driven I/O
- c) Hardware Controlled I/O

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

- d) I/O controlled by Handshake signals
- e) I/O controlled by ready signal

58. Differentiate between Memory Mapped and I/O Mapped I/O.

Memory Mapped I/O	I/O Mapped I/O
In this device address is 16 bit. Thus A ₀ to A ₁₅ lines are used to generate device address	In this I/O device address is 8-bit. Thus A ₀ to A ₇ lines or A ₈ to A ₁₅ lines are used to generate device address.
$\overline{\text{MEMR}}$ and $\overline{\text{MEMW}}$ control signals are used to control read and write I/O operations	$\overline{\text{IOR}}$ and $\overline{\text{IOW}}$ control signals are used to control read and write I/O operations
Instructions available are <ul style="list-style-type: none"> • LDA addr • STA addr • LDAX rp • STAX rp • MOV M,R • MOV R,M • ADD M CMP M etc.,	Instructions available are IN and OUT
Data transfer is between any register and I/O Device	Data transfer is between accumulator and I/O device
Maximum number of I/O devices are 65536 Theoretically	Maximum numbers of I/O devices are 256.
Execution speed using LDA addr, STA addr is 13 T-state and 7 T-states for MOV M, r and MOV r, M instructions	Execution speed is 10 T-states
Decoding 16 bit address may require more hardware	Decoding 8 bit address will require less hardware

59. What do you mean by an Interrupt and differentiate between Vectored Interrupts and Non-Vectored Interrupts.

SRI SAI RAM ENGINEERIG COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

It is a request for service from any external device or a program.

Vectored Interrupts:

When interrupt signal is activated, the internal control circuit of the microprocessor produces a CALL to a predetermined memory location. This memory location, where the subroutine starts is referred to as a vector location and such interrupts are called vectored interrupts.

60 What do you mean by Maskable and Nonmaskable interrupts?

Maskable interrupts are enabled and disabled under program control by setting particular flip-flops in the microprocessor.

When masked, microprocessor does not respond to the interrupt even though the interrupt is activated.

The interrupts, which cannot be masked under software control, are called Nonmaskable interrupts.

61. What are the hardware interrupts available in 8085?

Hardware Interrupts: Some pins on the 8085 allow peripheral device to interrupt the main program for I/O operations. When an interrupt occurs, the 8085 completes the instruction it is currently executing and transfers the program control to a subroutine that services the peripheral device. Upon completion of the service routine, the CPU returns to the main program. These types of interrupts, where CPU pins are used to receive interrupt requests are called hardware interrupts.

The hardware interrupts are

To clear TRAP interrupt either reset microprocessor or give a high TRAP

ACKNOWLEDGE

Interrupt Type	Trigger	Priority	Maskable	Vector Address
TRAP	Edge and Level triggered	1 st Highest	No	0024H
RST 7.5	Edge	2 nd	Yes	003CH
RST6.5	Level	3 rd	Yes	0034H
RST 5.5	Level	4 th	Yes	002CH
INTR	Level	5 th (Lowest)	Yes	-

62. What is the Response for INTR instruction in an 8085 microprocessor?

1. The 8085 checks the status of INTR signal during execution of each instruction

SRI SAI RAM ENGINEERIG COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

2. If INTR signal is high, then 8085 completes its current instruction and sends an active low interrupt acknowledge signal (INTA) if the interrupt is enabled.
3. In response to the INTA signal, external logic places an instruction OPCODE on the data bus. In the case of Multibyte instruction, additional interrupt acknowledge machine cycles are generated by the 8085 to transfer the additional bytes into the microprocessor.
4. On receiving the instruction, the 8085 saves the address of next instruction on stack and executes received instruction.

63. What is the Response for RST instruction in an INTA Machine Cycle in 8085?

If the external device places an opcode for any one of the RST instructions, then 8085 pushes the contents of PC onto the stack. It then branches the program control to the vector address of the corresponding RST instruction.

64. What is the Response for CALL instruction in an INTA Machine cycle in 8085?

If the external device places an opcode for CALL instruction then 8085 generates two additional interrupt acknowledge cycles.

1. It sends an active low interrupt acknowledge signal second time
2. In response to second INTA signal, external logic places the lower byte address for the CALL instruction
3. After receiving lower byte address, 8085 sends the third interrupt acknowledge signal
4. In response to third INTA signal, external logic places the higher byte address for the CALL instruction
5. After receiving sixteen-bit address for CALL, 8085 pushes the contents of the PC onto the stack and branches the program control to the subroutine whose address is received from the external logic.

65. How do you implement Software Interrupts in 8085?

Software: In software interrupts, the cause of the interrupt is an execution of the instruction. These are special instructions supported by the microprocessor. After execution of these instructions microprocessor completes the execution of the instruction it is currently executing and transfers the program control to the subroutine program. Upon completion of the execution of the subroutine program, program control returns to the main program.

There are eight software interrupts from RST 0 to RST 7 for the 8085 processor.

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

Vector address for these interrupts = interrupt number X 8

Instruction Code	HEX Code	Vector Addresses
RST 0	C7	0 X 8 = 0000H
RST 1	CF	1 X 8 = 0008H
RST 2	D7	2 X 8 = 0010H
RST 3	DF	3 X 8 = 0018H
RST 4	E7	4 X 8 = 0020H
RST 5	EF	5 X 8 = 0028H
RST 6	F7	6 X 8 = 0030H
RST 7	FF	7 X 8 = 0038H

66. How can you mask or unmask interrupts in 8085?

Masking / Unmasking for Interrupts

- EI – Enable Interrupt
 - DI – Disable Interrupt
 - Using SIM and RIM instructions.
- } Enables/disables Interrupt enable flip-flop in flag reg.

67. Write in detail about the usefulness of SIM and RIM instruction.

SIM – Set Interrupt Mask – used to set interrupt mask and to send serial output. It transfers the contents of accumulator to interrupt control logic and serial I/O port.

SOD	SDE	X	R7.5	MSE	M7.5	M6.5	M5.5
-----	-----	---	------	-----	------	------	------

SOD – Serial Output Data (decide whether the data is to be sent on the serial output pin of 8085)

SDE – 1- enable 0 – disables Serial Output Data

R7.5 – Reset RST 7.5 request

MSE – Enables/disables the masking control

M7.5, M6.5 and M 5.5 will set/reset the mask bits for RST 5.5, RST 6.5, and RST 7.5 of the interrupt mask register.

RIM – Read Interrupt Mask

It loads the status of the interrupt mask, the pending interrupts and the contents of the serial input data line, SID, into the accumulator.

SID	I 7.5	I 6.5	I 5.5	IE	M7.5	M6.5	M5.5
-----	-------	-------	-------	----	------	------	------

SID – Serial Input Data

I 7.5, I 6.5, I 5.5 – gives the status of pending interrupts

SRI SAI RAM ENGINEERING COLLEGE, CHENNAI – 44.
DEPARTMENT OF COMPUTER APPLICATIONS

Subject Code: MC1702

Subject Name : Microprocessors and Its Applications

IE – status of Interrupt Enable Flag

M7.5, M6.5 and M 5.5 will set/reset the mask bits for RST 5.5, RST 6.5, and RST 7.5 of the interrupt mask register.

68. What are the Limitations of 8-bit microprocessor?

Register Set – Number of registers is very limited

Address space – Utmost 64 Kbytes

Data Types – Supports only one or two types of data – viz. signed integer and BCD

Addressing Modes – supports only 5 addressing modes

Instruction Set – Very few instructions are supported

Moreover the following advanced features are not supported by 8085

- Multiprogramming
- Pipelined architecture
- Virtual memory support
- Multiprocessing

69. What are the various Applications of 8085?

The 8-bit processor is being used in a variety of applications such as appliances, automobiles and industrial process and control applications. The Z80 type 8-bit microprocessors are used in integrated devices. For many industrial applications the 8-bit microprocessors are used and they are also used in the educational setting to teach basic concepts.

Some applications that use 8-bit microprocessors include:

- Toys: Video games, programmable robots
- Complex, intelligent consumer product controllers: VCR control and programming, security systems, lighting system controllers
- Computer Peripherals: Video displays, higher-speed printers, modems, plotters, disk controllers, communication controllers
- Industrial controllers: Robotics, substation data gathering, process control, sequence control, machine tool control
- Instruments: Logic analyzers, communication analyzers, disk drive testers, digital oscilloscopes, smart voltmeters.