



# 8 ST. ANNE'S

## COLLEGE OF ENGINEERING AND TECHNOLOGY

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### QUESTION BANK

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**BRANCH:** EEE

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**SUB CODE/NAME:** EE8551- MICROPROCESSORS AND MICROCONTROLLERS

### TWO MARKS WITH ANSWERS

#### UNIT 1 8085 PROCESSOR

**1. List the registers of 8085 processor. [Nov/Dec-18]**

The **8085** has six general-purpose **registers** to store 8-bit data; these are identified as- B, C, D, E, H, and L. These can be combined as **register** pairs – BC, DE, and HL, to perform some 16- bit operation.

**2. State any four pins of 8085 processor which are used to generate control and status signals. [Nov/Dec-18]**

- Control and Status Signals:
- Power Supply and Clock Frequency:
- Interrupts and Peripheral Initiated Signals: ...
- Reset Signals:
- DMA Signals:
- Serial I/O Ports

**3. List the features of accumulator. [Apr/May-18]**

- ✓ **Accumulator.** It is an 8-bit register used to perform arithmetic, logical, I/O & LOAD/STORE operations
- ✓ Arithmetic and logic unit.
- ✓ General purpose register.
- ✓ Program counter.
- ✓ Stack pointer.
- ✓ Temporary register.
- ✓ Flag register.
- ✓ Instruction register and decoder.

**4. write the difference between standard I/O and memory mapped I/O [Apr/May-18]**

The main difference between memory mapped IO and IO mapped IO is that the memory mapped IO uses the same address space for both memory and IO device while the IO mapped IO uses two separate address spaces for memory and IO device. Memory-mapped IO uses the same address space to address both memory and I/O devices

**5. What are the flags available in 8085 processor? List the 8085 flags. (Dec-2014, Dec-2013,17)**

Various flags are :

S (Sign flag), Z (Zero flag), AC (Auxiliary carry flag), P (Parity flag), CY (Carry flag).

**6 . List the five interrupt pins available in 8085[may 2010] (OR) What are the interrupts available in 8085? [Nov/Dec-17]**

The five interrupt pins available in 8085 are

- TRAP
- RST 6.5
- RST 5.5
- INTR

**7. How many machine cycles does 8085 have, mention them? OR What are the different machine cycles in 8085 microprocessor? (May-2008) (or) List out the machine cycles of 8085 microprocessor.[Apr/May-17]**

The 8085 have seven machine cycles they are

- Opcode fetch
- Memory read
- Memory write
- I/O read
- I/O write
- Interrupt acknowledge

**8. why data bus is bidirectional?**

Data bus is Bidirectional because the Microprocessor can read data from memory or write data to the memory.

**9. write an 8085 assembly program to add two digit BCD numbers in memory locations 5000H and 5001H and store the result in memory location 5002H.**

**10. What is the function of program counter in 8085 microprocessor? [may 2013][May/Jun-16]**

Program counter stores the address of next instruction to be fetched. Thus it is used as pointer to the instruction.

**11. 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

**12. What is the function of ale in 8085 microprocessor?**

ALE stands for Address Latch Enable. It is the 30th pin of 8085 which is used to enable or disable the address but the address bus will be enabled during the 1st clock cycle as the ALE pin goes high

**13. List the control and status signal of 8085 microprocessor and mention its need?[dec 12,08,06]**

**ALE (Output):**

- Address Latch Enable: It occurs during the first clock cycle of a machine state and enables the address to get latched into the on chip latch of peripherals.
- The falling edge of ALE is set to guarantee set up and hold times for the address information. ALE can also be used to store the status information.

**RD(Output3state):**

READ: indicates the selected memory or I/O device is to be read and that the Data Bus is available for the data transfer.

**WR (Output3state):**

WRITE: indicates the data on the Data Bus is to be written into the selected memory or I/O location. Data is set up at the trailing edge of WR. 3stated during Hold and Halt modes.

**IO/M,S0,S1:**

- IO/M indicates whether input output operation or memory operation is being carried out.
- S0 and S1 indicated the type os machine cycle in progress.

**READY(Input):**

If Ready is high during a read or write cycle, it indicates that the memory or peripheral is ready to send or receive data .

If Ready is low, the CPU will wait for Ready to go high before completing the read or write cycle.

**14. Specify the size of data, address, memory word and capacity of 8085 microprocessor[may 2011]**

- Size of data bus =8 bits
- Size of address bus=16bit
- Size of memory word=8 bit
- Memory capacity=64kb

**15. What is the need of ALE signal in 8085 microprocessor? OR Mention the use ALE [ Dec- 13,10may 2010, May/June-15,Nov/Dec-15]**

- This is used to demultiplex AD0 to AD7 lines to A0-A7 and D0-D7.
- The separation of address line and data line is achieved by connecting a external latch to AD0-AD7 lines and enabling the latch when ALE signal is active.

**16. What is tristate logic?[june 2009]**

- Logic output has two states LOW and HIGH corresponding to the logic value 0 and 1.
- However some output have a third electrical state that is not logical called high impedance or floating state.
- In this state the output behaves as if it is not even connected to circuit except small leakage current that may flow into or out of the output pin. This state is tristate logic

**18. What is stack and what is the function of stack pointer[Dec 07,15]**

- The stack is a reserved area of memory in the RAM where temporary information may be stored.
- A 16 bit stack pointer is used to hold the address of most recent stack entry.

**19. Define the function of parity flag and zero flag in 8085 [May 12]**

- Parity Flag (PF): This flag is used to indicate the parity of result. If lower order 8-bits of the result contains even number of 1's, the Parity Flag is set and for odd number of 1's, the Parity Flag is reset.
- Zero Flag (ZF) : It is set; if the result of arithmetic or logical operation is zero else it is reset.

**20. What is the important control signal in 8085 microprocessor [Dec 08]**

The important signals in 8085 microprocessor are: ALE, IO/M, RD/WR.

**21. Why interfacing is needed for I/O devices?**

Generally I/O devices are slow devices. Therefore the speed of I/O devices does not match with the speed of microprocessor. And so an interface is provided between system bus and I/O devices.

**22. Why address bus is unidirectional?**

The address is an identification number used by the microprocessor to identify or access a memory location or I/O device. It is an output signal from the processor. Hence the address bus is unidirectional.

**23. What are machine language and assembly language programs?**

The software developed using 1's and 0's are called machine language, programs. The software developed using mnemonics are called assembly language programs.

**24. What are the basic units of a microprocessor ?**

The basic units or blocks of a microprocessor are ALU, an array of registers and control unit

**25. Steps involved to fetch a byte in 8085?**

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

**26. 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.

**27. State the functions of keyboard interrupts. [Dec-14]**

Keyboard interrupt is special case of signal usually generated by the keyboard in the text user interface. This signal is used to generate a hardware interrupt when a key is pressed or released.

**28. What is meant by level-triggered interrupt? Which of the interrupts in 8085 are level triggered? (May-2014)**

A level triggered interrupt is an interrupt signaled by maintaining the interrupt line at a high or low level. A device wishing to signal a level triggered interrupt drives the interrupt request line to its active level (high or low), and then holds it at that level until it is recognized by microprocessor. In 8085 microprocessor, RST 5.5, RST 6.5, INTR, TRAP are level triggered interrupts. TRAP is both level as well as edge triggered interrupt.

**29. What is trap interrupt and its significance? (May-2012)**

This interrupt is a non-maskable interrupt. It is unaffected by any mask or interrupt enable. TRAP has the highest priority. TRAP interrupt is edge and level triggered. This means that the TRAP must go high and remain high until it is acknowledged. This avoids false triggering caused by noise and transients.

**30. To obtain a 320 ns clock, what should be the input clock frequency? What is the frequency of clock signal at CLK OUT? (May-2014)**

System clock frequency =  $1/T = 1 / 320 \times 10^{-9} = 3.125$  MHz

Crystal clock frequency =  $2 \times$  System clock frequency

$$= 2 \times 3.125 \times 10^6$$

$$= 6.25 \text{ MHz}$$

The frequency of clock signal at CLK OUT = Crystal frequency/2

$$= 6.25/2$$

$$= 3.125 \text{ MHz.}$$

**31. What is interrupt? (May-2006, May-2009)**

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

**32. How performance of a microprocessor is measured in terms of MIPS? (June-2007)**

The performance of a microprocessor is measured in terms of MIPS (Million instructions per Second).

$$\text{MIPS rate} = 1/(\text{Average time required for the execution of instruction} \times 10^6)$$

**33. Differentiate Software and Hardware interrupts.**

The Software interrupt is initiated by the main program, but the hardware interrupt is initiated by the external device. In 8085, Software interrupts cannot be masked or disabled, but in hardware interrupts except TRAP all other interrupts can be masked.

In 8086, Software interrupts cannot be masked or disabled, but in hardware interrupts except .NMI all other interrupts can be masked.

**34. Define (i) Instruction cycle (ii) Machine cycle and list (Nov/Dec 2016)**

(i) The sequence of operations that a processor has to carry out while executing the instruction is called Instruction cycle. Each instruction cycle of a processor indium consists of a number of machine cycles. (ii) The processor cycle or machine cycle is the basic operation performed by the processor. To execute an instruction, the processor will run one or more machine cycles in a particular order. opcode fetch, memory read, memory write, I/O read, I/O write, interrupt acknowledge, halt and hold .

**PART -B**

1. with neat block diagram , explain the various functional building blocks of 8085 microprocessor. [ Nov/Dec-18] .[Apr/May-18] (Or) Explain with a neat block diagram the architecture of 8085 microprocessor. [Nov/Dec-17] [Nov/Dec-16] [May/Jun-16] [Apr/May-15] [Nov/Dec-15](13)
2. Define vector address. List the various interrupts of 8085 processor and elucidate the use of Interrupt service routine. [ Nov/Dec-18] (13) (or) Describe the interrupts of 8085 and its types with service routine.[Apr/May-18] (7)
3. Describe the interrupts of 8085 microprocessor.[Nov/Dec-17] [May/Jun-16] (7) (or) Explain the interrupt structure of 8085 microprocessor. [Apr/May-17] [Apr/May-15] [Nov/Dec-15] (8)
4. Draw and explain the flag register of 8085 in brief. [Nov/Dec-17](6)
5. With pin diagram explain 8085 microprocessor. [Apr/May-17] (8)
6. Draw the timing diagram of MOV A,M instruction and explain each machine cycle. [Apr/May-18]
7. Explain the register of 8085 microprocessor? [Apr/May-17] (8)
8. What is meant by memory interfacing? Explain with an example. [Apr/May-17] (8)
9. Draw the timing diagram for I/O read and write machine cycles. [Nov/Dec-16] (8) (or) Draw the timing diagram of memory READ and WRITE operations in 8085 microprocessor.[Apr/May=15] (8) (or) Draw the timing diagram of Opcode fetch machine cycle. [Apr/May-15] (8)
10. Draw the interfacing diagram to interface 8085 with 2KB RAM and 4KB EPROM. [Nov/Dec-16] (8)
11. Explain the timing diagram of STA 526A<sub>H</sub>. [May/Jun-16]
12. Describe the data transfer concepts in 8085 microprocessor.[A

**UNIT 2**  
**PROGRAMMING OF 8085 PROCESSOR**

**1. State any four data transfer instructions and their function.[Nov/Dec-18]**

**MOV**-This instruction copies the contents of the source register into the destination register without any alteration.

Ex:MOV K, L

**MVI**-The 8-bit data is stored in the destination register or memory.

**Example** – MVI K, 55L

**LDA**-The contents of a memory location, specified by a 16-bit address in the operand, are copied to the accumulator.

**Example** – LDA 2034K

**XCHG**-The contents of register H are exchanged with the contents of register D, and the contents of register L are exchanged with the contents of register E.

**Example** – XCHG

**2. What are subroutine? (or) Define subroutine [Nov/Dec-18]**

- 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 an near procedure other wise it is a far procedure.

**3. List out the five categories of the 8085 instructions. Give e.g. of the instructions for each group?[December 2011] (or) List the classification of instruction based on its size.[Apr/May-18]**

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

**4. Define stack and stack related instructions? [May/June-16] (or) What is the function of stack? [may-13 and Dec-12] (or) Define stack.[Apr/May-18]**

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

**5. What is the use of addressing modes, mention the different types?[may 2012] (or) What are the types of addressing mode in 8085 microprocessor?[Nov/Dec-17] (Or) Classify the addressing modes of 8085 microprocessor.[Nov/Dec-16]**

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

**6. Explain the difference between a JMP instruction and CALL instruction.**  
[May/June2012] (or)

**Differentiate CALL instruction from JUMP instruction.**[Nov/Dec-17]

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.

**7. Explain the different instruction format set [June 09] (or)**

**List different instruction formats.**[Apr/May-17]

The instruction set is grouped into the following formats One byte instruction

MOV C,A Two byte instruction MVI A,39H Three byte instruction JMP2345H

**8. What is CALL instruction? (or) What is the function of the CALL instruction?**  
(N/D16)

CALL instruction changes the sequence to the location of a subroutine.

**9. What is the function of rotate instructions? Give an example. (M/J 15)[ Apr/May-15]**

Rotate instruction is used to rotate the accumulator content left to carry or right to carry. It can also be left through carry or right through carry. One example is RLC which means rotate the accumulator content left to carry. If the data 32H is given with a carry bit then after giving RLC for this, data becomes 64H and carry of 00H.

**10.How is time delay generated using subroutines?[Apr/May-15]**

When the delay subroutine is executed, the microprocessor does not execute other tasks.

For the delay we are using the instruction execution times. executing some instructions in a loop, the delay is generated. There are some methods of generating delays. These methods are as follows.

- Using NOP instructions
- Using 8-bit register as counter
- Using 16-bit register pair as counter.

**11.What is an instruction?**

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

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

There are 74 operations in the 8085 microprocessor

**13.Explain the use of branch instruction and give example.[may 2012]**

JMP instruction permanently changes the program counter. A CALL instruction leaves Information on the stacks that the original program execution sequence can be resumed.

**14..Explain the purpose of the I/O instructions IN and OUT[may 10]**

- The IN instruction is used to move data from an I/O port into the accumulator.
- The OUT instruction is used to move data from the accumulator to an I/Oport.
- The IN and OUT instructions are used only on microprocessor, which usea separate address space for interfacing.

**15. What is the difference between the shift and rotate instructions?**

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

**16. List the four instructions which control the interrupt structure of the 8085 microprocessor?[may 2013]**

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

**17. Mention the categories of machine control group of instruction [may 2013]**

The instructions of 8085 can be categorized into the following five

1. EI
2. DI
3. NOP
4. HLT
5. SIM
6. RIM

**18. Explain LDA, STA AND DAA instructions**

LDA copies the data byte into 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.

**19. Why do we use XRA instruction?**

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

**20. Compare CALL and PUSH instructions**

<b>CALL</b>	<b>PUSH</b>
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

**21. What is indexing?[ NOV/DEC 2012]**

Indexing technique allows programmer to point or refer the data stored in sequential memory locations one by one.

**22. Explain the functioning of CMP instructions? [NOV/DEC 2015]**

This instruction subtracts the contents of the specified register from contents of the accumulator and sets the condition flags as a result of the subtraction.

**23. Define two-byte instruction with one example? (M/J 12)**

In a 2-byte instruction, the first byte specifies the Opcode; the second byte specifies the operand.

Example: MVI A, D8H.

**24. How is PUSH B instruction executed? Find the status after the execution(May/June 2016)**

This instruction decrements SP by one and copies the higher byte of the register pair into the memory location pointed by SP. Then decrements the SP again by one and copies the lower byte of the register pair into the memory location pointed by SP. Ex: SP=2000H, DE=1050H

**25. Mention the similarity and difference between compare and subtract instructions. (M/J 14)**

The compare and subtract instructions in the 8085 both subtract one operand from another, and set flags accordingly. The subtract instruction stores the result in the accumulator, while the compare instruction does not - except for the flags, the compare instruction "throws" the result away.

**26.State the purpose and importance of NOP instruction. (M/J 14)**

The NOP instruction is a no-operation instruction. It does nothing to the state of the machine, except to use some time. In the case of the 8085, it uses four clock cycles plus however many wait states is need to access the NOP instruction from memory.

**27. What are the instructions associated with a subroutine? (N/D 13)**

Instructions are CALL & RET.

**PART-B**

- 1. Define addressing mode. Identify the addressing mode of the following instructions and explain them. [Nov/Dec-18] (13)**
  - (i) STA 6350H
  - (ii) CMA
  - (iii) MOV A,M
  - (iv) MOV D,E
  - (v) MVI A,A7H
- 2. Develop an algorithm and 8085 assembly language program to sort 100 byte type data. Explain the instruction used in the program. [Nov/Dec-18] (13) (or) Write an assembly language program to sort numbers in ascending order.[May/June-16](7)**
- 3. Explain the types of addressing modes in 8085 with suitable example.[Apr/May-18](7) (or) Explain the addressing modes of 8085 microprocessor.[Apr/May-17](8)[Apr/May-15]**
- 4. Write an 8085 program to find the greatest number among 10 numbers.[Apr/May-18](6) (or) Write an 8085 assembly languagr program to find the largest among 'N' number where the value of N should be stored in 4200 and the array of elements from 4201. Store the result in 4300?[Apr/May-17](8)**

5. Explain the types of instruction in 8085 with example.[Apr/May-18](7)
6. Write an 8085 program to find the average of 10 numbers and find the execution time of program. [Apr/May-18](6)
7. With example, explain the different addressing modes of 8085 and the different types of instruction formats.[Nov/Dec-17](13)
8. Explain the operation carried out when 8085 executes the instructions: [Nov/Dec-17](13)
  - (i) MOV A,M (2)
  - (ii) XCHG (2)
  - (iii) DAD B (2)
  - (iv) DAA (2)
  - (v) LDA 6000 (2)
  - (vi) SHLD 4000 (2)
9. Write an 8085 assembly language program to divide an 8 bit number by another 8 bit number? [Apr/May-17] (7)
10. What is meant by subroutine? Explain how the stack is affected while calling a subroutine program. [Apr/May-17] (8)
11. Explain the logical instruction with examples.[Nov/Dec-16] (6)
12. Write an 8085 assembly program to convert a Hexadecimal number to ASCII code. [Nov/Dec-16] (7)
13. Write an 8085 Assembly language program to multiply two numbers in memory locations 4200 and 4201 and store the product in memory locations 4202 and 4203. [Nov/Dec-16] (13)
14. Compare memory mapping and I/O mapping technique in 8085.[May/June-16](7)
15. Describe the categories of instructions used for data manipulations in 8085 microprocessor. [May/June-16][8]

**UNIT -3**  
**8051 MICRO CONTROLLER**

- 1. List the features of 8051 microcontroller?[may 16] (Or) State any four inbuilt features of 8051 microcontroller.[Nov/Dec18] (Or) What are the main features of 8051 microcontroller?[Nov/Dec-17]**

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.

- 2. How multiplication is performed in 8085 and 8051? [Nov/Dec18]**

8051 provides **MUL A B** instruction. By using this instruction, the multiplication can be done. In some other microprocessors like 8085, there was no **MUL** instruction. In that microprocessor, we need to use repetitive **ADD** operations to get the result of the multiplication

- 3. Compare Microprocessor and Microcontroller. [Apr/May-18]**

	<b>Microprocessor</b>	<b>Microcontroller</b>
	It is termed as general purpose digital computer	It is termed as special purpose digital controller.
	It contain CPU, Memory addressing circuit and interrupt handling circuit.	It possesses all features of microprocessor and additionally include timers parallel and serial I/O and the internal RAM and ROM.
	It has one or two types of bit handling instructions.	It has many bit handling instructions.
	Memory and I/O accessing time is large	Memory and I/O accessing time is less

- 4. How the microcontrollers respond to any interrupt request?[Apr/May-18]**

A **microcontroller** CPU will be designed to **respond** to a number of different **interrupt** sources (perhaps 10 to 100 sources, typically), and each source can have specific user-written code which executes when that **interrupt** triggers. The code that executes for an **interrupt** is called the "**interrupt** service routine" or **ISR**.

- 5. List the addressing modes of 8051?[dec09 may 13] (or) What are the addressing modes of 8051 microcontroller?[Nov/Dec-17](or) Classify the addressing modes of 8051 microcontroller.[Apr/May-17]**

- Direct addressing
- Register addressing
- Register in direct addressing Implicit addressing Immediate addressing
- Index addressing
- Bit addressing

**6. List any four Special Function registers.[Apr/May-17 (Or) Name the special functions registers available in 8051[Dec10]**

- Accumulator
- B Register
- □Program status Word.
- Stack pointer.
- Data pointer
- Port0
- Port1
- Port2
- Port3
- Interrupt priority control register. Interrupt enable control register.

**7. Explain the interrupts of 8051 microcontroller.[Nov/Dec16] (OR) Name the five interrupt sources of 8051?[may 08 dec08] (or) List the interrupt sources in 8051 microcontroller. (M/J 14), (N/D 15), (N/D 16)**

- The interrupt are: Vector address
- External interrupt 0: IE0:0003H
- Timers interrupt 0: TF0:000BH
- External interrupt1: IE1:0013
- Timers interrupt1: TF1:001BH
- Serial interrupt
- Receive interrupt: RI:0023H Transmit interrupt:TI:0023H

**8. Mention the purpose of *PSEN* and *EA* in 8051microcontroller.(M/J 14), (N/D16)**

**PSEN:** If external ROM is used for storing program then a logic zero (0) appears on it every time the Microcontroller reads a byte from memory.

**EA :** By applying logic zero to this pin, P2 and P3 are used for data and address transmission with no regard to whether there is internal memory or not. It means that even there is a program written to the microcontroller, it will not be executed. Instead, the program written to external ROM will be executed. By applying logic one to the EA pin, the microcontroller will use both memories, first internal then external (if exists).

**9. Explain the mode 0 of 8051 ports.(May/June 2016)**

In mode 0,the serial port functions as half duplex serial port at fixed baud rate and one data character is framed as 8 bits.

**10. Write down the instruction format of 8051 microcontroller.[Apr/May-15]**

The instruction format is given by

LABEL: MNEMONIC OPERAND1, OPERAND2; COMMENT

The first field LABEL is an identifier which is optional. The second field is mnemonic which is compulsory. All instructions must contain mnemonics. The third fields are operands. The last field is comments.

**11. What is the purpose of timing diagram in 8051 microcontroller? (Apr/may2015)**

The timing diagram depicts the machine cycles generated for each instruction. It includes the memory read write cycle and I/O read write cycle.

**12. 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.

**13. Explain DJNZ instruction of Intel 8051 microcontroller ?[June 2013]**

DJNZ Rn l Decrement the content of the register Rn and jump if not zero.

DJNZ direct, rel Decrement the content of direct8 –bit address and jump if not zero

**14. State the function of RS1 and RS0 bits in the flag register of Intel8051microcontroller?**

- RS1,RS0-Register bank select bits
- RS1,RS0-Bank
- Bank0
- Bank1
- Bank2
- Bank3

**15. Give the alternate functions for the port pins of port3?[Dec 11 May 11]**

- RDWRT1T0
- 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–Interrupt1 input pin
- INT0– interrupt0 input pin
- TXD–Transmit data pin for serial port in UART mode
- RXD–Receive data pin for serial port in UART mode.

**16. What are the applications of microcontroller [may 2012]**

- Calculators
- Traffic light control system
- Game machine
- Military applications.

**17. Give the memory size of 8051 microcontroller [may 2010]**

The 8051 can access upto 64 kilobyte of program memory and 64 kilo byte of data memory.

**18. Explain the register IE format of 8051.[dec 2011]**

- EA-Enable all control bit.
- ET2-Timer2 interrupt enable bit.
- ES- Enable serial port control bit.
- ET1-EnableTimer1controlbit.
- EX1-Enableexternalinterrupt1controlbit.
- ET0-EnableTimer0controlbit.
- EX0-Enableexternalinterrupt0controlbit

**19. 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)

**20. Give the details of PSW of 8051. (May/June 2010)**

The PSW stores the status of the results of the ALU operations and some of the status of the processor by means of 1 bit status flags. The PSW is also known as flag register. The flags are useful for the programmer to test condition of the result and make decisions. The PSW consists of four math flags and two register bank select bits. The Math flag are carry, auxiliary carry, overflow and parity flag. The register bank select bits are RS0 and RS1.

**21. Mention the registers used for serial communication in 8051 Microcontroller? (Nov/Dec 2014)**

SCON- Serial port control register, SBUF- Serial port data buffer are the registers used for serial communication in 8051 Microcontrollers.

**22. Write the functions of TMOD register in 8051 Microcontroller.(Nov/Dec 2015)**

Gate	C/T	M1	M0	Gate	C/T	M1	M0
<b>Timer 1</b>				<b>Timer0</b>			

GATE- When GATE =1 hardware control GATE =0, software control  
- Set 0 for Timer operation and Set 1 for Counter operation

M1 M0- Mode selector bit

0 0 - 13 bit timer

0 1 - 16 bit timer / counter

1 0 - 8 bit auto-reload timer /counter

1 1 - TL 0 is an 8 bit timer /counter controlled by standard timer 0 control bits. TH0 is an 8 bit timer controlled by timer 1 control bits

**PART-B**

1. Explain the pinouts of 8051 microcontroller.[Nov/Dec-18] (13)
2. Describe the timing diagram of external data memory read cycle of 8051. [Nov/Dec-18] (13)
3. Draw and explain the architecture of 8051 microcontroller.[Apr/May-18](13)  
(or) Explain the architecture of 8051 microcontroller with block diagram.[Apr/may-17](13) (or) Explain with a neat functional block diagram the 8051 microcontroller hardware.[Apr/May-15](13)
4. Briefly discuss the ports of 8051, internal circuits and its functions in detail. [Apr/May-18](13)
5. Draw the data memory structure of 8051 microcontroller and explain. [Nov/Dec-17] (7)

- 6. Explain with block diagram, how to access external memory devices in an 8051 based system. [Nov/Dec-17] (6)**
- 7. Explain Timer modes of 8051 microcontroller.[Apr/May-17](13)**
- 8. Explain the interrupt structure of 8051 microcontroller.[Nov/Dec-16](8) [Apr/May-15] (OR) Explain the vectored interrupts in 8051 microcontroller.[May/june-16](7)**
- 9. Explain the RAM structure of 8051 microcontroller.[Nov/Dec-16](8)**
- 10. Explain the I/O ports of 8051 microcontroller in detail.[Nov/Dec-16](13) (OR) Explain various I/O ports and its functions of 8051 microcontroller.[Apr/May-15](8)**

**UNIT -4**  
**PERIPHERAL INTERFACING**

1. Find the control word of 8255 if port A is configured as input and port B is configured as output in mode 0. [Nov/Dec-18] (OR) Write the control word value for 8255 PPI when PORT A AND PORT B are inputs in simple I/O mode. (Nov/Dec 2015,2016)(May/June 2016)

D7	D6	D5	D4	D3	D2	D1	D0
1	0	0	1	X	0	1	X

2. state the application of 8251 and 8279 ICs.[Nov/Dec-18]

3. What are the modes of operation used in 8253?[MAY 08 MAY 09] (OR) Write the modes of operation in 8254.[Apr/May-18] (Or) What are the working modes of 8254 timer?(Nov/Dec 2015)

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

- Mode0 (Interrupt on terminal count)
- Mode1 (Programmable mono shot)
- Mode2 (Rate generator)
- Mode3 (Square wave generator)
- Mode4 (Software triggered strobe)
- Mode5 (Hardware triggered strobe)

4. List the operating modes in 8253 timer/counter? (Nov/Dec 2014)

- Mode 0: interrupt or terminal count
- Mode 1: Rate generator
- Mode 3: square wave generator
- Mode 4: software triggered strobe

5. How is keyboard interfaced with microprocessor? [Nov/Dec-17]

The key board **interfaced** is a matrix **keyboard**. So only two ports of 8051 can be easily connected to the rows and columns of the key board. Whenever a key is pressed, a row and a column gets shorted through that pressed key and all the other keys are left open

6. what is meant by cascading in 8259? [Apr/May-17]

When more than one 8259s are connected to the microprocessor, it is called as a **cascaded** configuration. The INT output of the master is connected to the INTR input

of the microprocessor. The master addresses the individual slaves through CAS2, CAS1 and CAS0 lines connected from the master to each of the slaves.

**7. Draw the command word format of 8255 in I/O mode.[Nov/Dec-16]**

**8. List some of the features of 8259 Programmable Interrupt controller.[Nov/dec-16]  
(OR)Bring about the features of 8259. (May/June 2014) (Nov/Dec 2016)**

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

**9. What are the features used mode in 8255?[May/Jun-16]**

- Two groups A and group B are available for stored Data transfer.
- Each group contains one 8-bit data I/O port and one 4-bit control/data port.
- The 8-bit data port can be either used as input or output port. The inputs and outputs both are latched.

**10. What are the internal devices of a typical DAC?[May/June 2016]**

It includes R-2R resistor network, an internal latch and current to voltage conversion amplifier

**11. What is the use of 8051 chip?**

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

**12. 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.

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

The command words of 8259A are classified in two groups

- Initialization command words(ICWs)
- Operation command words(OCWs)

**14.. 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 2bit and provides a decoded1 out of 4scan on SL3-SL3.The keyboard and display both are in the same mode at a time.

**15.What are the modes used in keyboard modes?**

- Scanned Keyboard mode with 2Key Lockout
- Scanned keyboard with N-Key Rollover.
- Scanned Keyboard Special Error Mode.
- Scanned Matrix Mode.

**16.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 D7of the control word determines either the I/O functions of the BSR function.

**17.What is the size of ports in 8255?**

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

**18. What are the different ways to end the interrupt execution in 8259 PIC?[May/June 2011]**

AEOI (Automatic End of Interrupt) mode the ISR bit is reset at the end of the second INTA pulse. Otherwise, the ISR bit remains set until the issue of an appropriate EOI command at the end of the interrupt subroutine.

**19. What are the different peripheral interfacing used with 8085 microprocessor? [May/June 2013]**

PIC 8259, PPI 8255, USART 8251, Programmable keyboard/display interface 8279.

**20.What are the internal registers available in 8259 PIC? [May/June 2015]**

Interrupt mask register (IMR), Interrupt Request register (IRR) and In-service register (ISR)

## PART-B

1. Explain the architecture of 8259. [Nov/Dec-18](9) (OR) Explain the working of 8259 with a neat block diagram.(8)
2. How 8259 is interfaced with 8085 or 8051? [Nov/Dec-18](4)
3. Explain the interfacing of DAC with 8051 or 8085 with neat diagram and write a program for generating any typical waveform. [Nov/Dec-18](13)
4. Draw the functional diagram of 8255 and explain its control word, modes of operation.[Apr/May-18](13) (OR) Draw the block diagram of 8255(PPI) and explain its various operating modes.[Nov/Dec-17](13) (OR) Explain the functioning of 8255 programmable peripheral interface and its modes.[Apr/May-17]
5. Design an 8085 Based System With 512B RAM,4kb ROM, external keyboard and seven segment display device. [Apr/May-18](15)
6. With a neat diagram, explain the internal architecture of keyboard and display controller IC-8279. [Apr/May-18](13) (OR) Explain the working of 8279 as a keyboard/display controller and explain its command register and their functions.[Nov/Dec-16][May/June-16]
7. Explain the interfacing concept of analog to digital conversion with 8085 microprocessor. [Apr/May-18](15)
8. With necessary diagram, explain the different modes of operation of 8254, in detail. [Apr/May-18](15) (OR) Explain the working of 8254 timer with a neat block diagram and its command word format.[Nov/Dec-16](8) (OR) Draw and explain the functional block diagram of 8254 timer.[May/June-16] (8)

**UNIT-5**  
**Micro Controller Programming & Applications**

1. **State any four applications of microcontroller.[Nov/Dec-16] (OR)**  
**What are the applications of 8051 Microcontroller? (May/June 2012)**  
(i) Washing Machine control, (ii) Traffic Light control, (iii) Servo Motor control, (iv) Stepper motor control, (v) DC motor control.
2. **specify the difference between MOV and MOVX instructions.[Nov/Dec-16]**  
**MOV:** The **MOV** instruction moves data bytes between the two specified operands. The byte specified by the second operand is copied to the location specified by the first operand. The source data byte is not affected.  
**MOVX:** The **MOVX** instruction transfers data between the accumulator and external data memory. External memory may be addressed via 16-bits in the DPTR register or via 8-bits in the R0 or R1 registers. When using 8-bit addressing, Port 2 must contain the high-order byte of the address.
3. **what are the advantage of closed loop control system for interfacing.[Apr/May-18]**  
**Closed loop control systems** are more accurate even in the presence of non-linearities. The sensitivity of the **system** may be made small to make the **system** more stable. The **closed loop systems** are less affected by noise.
4. **what is baud rate[Nov/Dec-17]**  
The **baud rate** is the **rate** at which information is transferred in a communication channel. In the serial port context, "9600 **baud**" means that the serial port is capable of transferring a maximum of 9600 bits per second.
5. **what is duty cycle in PWM[Nov/Dec-17]**  
A **PWM** signal consists of two main components that define its behavior: a **duty cycle** and a frequency. The **duty cycle** describes the amount of time the signal is in a high (on) state as a percentage of the total time of it takes to complete one **cycle**
6. **Write a program to find 2's complement using 8051.[May/June 2016]**  
MOV A,#55,  
CPL A  
ADD A,01  
SJMP
6. **How a keyboard matrix is formed in keyboard interface.[May/June 2016]**  
The return lines, RLo 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.
7. **What are the control signals from 8051 microcontroller required for washing machine control? [May/June 2015]**  
Fill, Agitate, Drain and spin operation signals are the control given through microcontroller.
8. **How pulse is generated using 8051 microcontroller?[May/June2015]**  
MOV TMOD, #01 ;           Timer 0, mode1(16-bit)  
HERE: MOV TLO, #0F2H ;   Timer value =FFF2H  
MOV TH0, #0FFH  
CPL P1.5

ACALL DELAY  
SJMP HERE

**9. Mention any four data transfer instructions of 8051 microcontroller[Nov/Dec2016]**

MOVX,MOV,MOV DPTR,MOVX A.

**10. What are the operations of washing machine?**

Fill, Agitate, Soak, Drain, and Spin.

**11. State the Principle of microcontroller based stepper motor control system.**

Crystal Oscillator of the Microcontroller generates the pulse for stepper motor. The interfacing of stepper motor requires a circuit which can generate the step pulses at the desired state and the direction signal.

**12. What is Program Status Word? (May/June 2014) (Nov/Dec2015,2016)**

The current state of the processor is stored in a register called Processor Status Word (PSW). The PSW contains bits which indicate such things as whether the previous arithmetic operations produced a positive, negative or zero result

**13. Give an example for DA instruction of 8051 microcontroller? (Nov/Dec2012)**

ADDA, #1 DAA

**14. Name different types of jump instructions.**

There are three forms of jump. They are LJMP (Long jump)-address 16; AJMP (Absolute Jump)- address 11; SJMP (Short Jump)-relative address

**15. Write a program to perform multiplication of 2 Nos using 8051?**

```
MOVA,#data1
MOVB,#data2
MULAB
MOVDPTR,#5000
MOV@DPTR,A(lower value)
INCDPTR
MOVA,B
MOVX@DPTR,A
```

**16. 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 into this stack.

**17. Write about the jump statement?**

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

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

```
MOVA,R0  
CPLA INCA
```

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

```
MOVA,#30H  
ADDA,#50H
```

**20. Write a program to swap two numbers using 8051?**

```
MOVA,#data  
SWAPA
```

### **PART-B**

- 1. Design a stepper motor control system using 8051 microcontroller. [Nov/Dec-18]  
(OR) Interface the stepper motor with 8051 and explain its operation of stepper motor with neat diagram and program to rotate in clockwise direction. [Apr/may-18] [Apr/May-17] [may/June-16] (13)**
- 2. Design a system using 8085 or 8051 to blink four LEDs. [Nov/Dec-18](13)**
- 3. Explain with neat diagram the closed loop control of servo motor using microcontroller. [Nov/Dec-17] [Apr/May-17] [may/June-16](13)**
- 4. Explain the interfacing of four digit 7 segment display to 8051 and its program. [Nov/Dec-16]**