

**MARIA COLLEGE OF ENGINEERING TECHNOLOGY, ATTOOR.**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

***MICROPROCESSORS AND MICROCONTROLLERS***

***Common to CSE AND IT***

**PART A**

*TWO MARK QUESTIONS AND ANSWERS*

*UNIT –I*

1. What is microprocessor?

Microprocessor is program control semiconductor devices which fetch instruction from memory and execute that instruction. Also it performs various arithmetic and logic operations.

2. Name three buses used in microprocessors based system.

Address bus

Data bus

Control bus

3. What are the advantages of a microprocessor based system?

Programmable system and hence the system is flexible

Cost is less

Simplifies and reduces the development time

Easy to handle and maintain

4. What is the difference between microcontroller and microprocessor? [Nov/Dec 2004]

Microprocessor is a single chip CPU that has alu and registers to perform arithmetic, logical operations. I/O devices, RAM and ROM are externally connected to form a single board microcomputer. Microcontroller is a single chip microcomputer which has built in microprocessor, RAM, ROM timer and ports.

5. What are the limitations of 8-bit microprocessor?

- Memory size is limited
- Speed is less
- Limited instruction set
- Limited addressing modes
- Co-processing is not possible

6. What is a subroutine? [Apr/May 2004]

A subroutine is a group of instructions written separately from the main program to perform a specific function. A subroutine may be called in the main program.

7. What is the function of program counter (PC) in 8085?

Program counter contains the address of the next instruction in the sequence to be executed. In this way PC helps the microprocessor to execute the program sequentially. Program Counter is also called Instruction pointer (IP).

8. What are flags?

Flags are individual flip flops which may be set or reset according to the arithmetic or logical operations performed in the ALU of the processor.

9. What are the flags available in 8085 explain?[Nov/dec 2004][Apr/May2005]

- CF-carry flag->if the result of an arithmetic or logical operation generates carry then the carry flag is set. Otherwise the carry flag is reset.
- PF-Parity flag->after the arithmetic or logical operations if the result has even number of 1's the parity flag is set. Otherwise it is reset.
- AC-Auxiliary flag->In an arithmetic operation when the carry is generated from bit D3 and passed on to the bit D4 the flag AC is set. This flag is used internally for BCD operations.
- ZF-Zero flag->If the result of an arithmetic and logical operation is zero this flag is set. Otherwise this flag is reset.
- SF-Sign flag->after the execution of an arithmetic or logical operation if the bit D7 of the result is 1 sign flag is set else it is reset.

10. Why the crystal frequency is divided by two internally by 8085?

8085 microprocessor has built in flip flop. It acts as a frequency divider to the crystal inputs X1 and X2. So the crystal frequency is divided two internally as the clock is taken from the output of the flip flop.

11. What is T-state? [Apr/May 2004][Apr/May 2005]

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

12. Define instruction cycle and machine cycle?

Instruction cycle: Time required to complete the execution of an instruction. An instruction cycle consist of one to six machine cycle.

Machine cycle: Time required to complete one operation of accessing memory or IO device. One machine cycle consist of 3 to 6 T-states.

13. What are the different machine cycles in 8085? [Apr/May 2005]

- Opcode fetch
- Memory read
- Memory write
- IO read
- IO write
- Interrupt Acknowledge
- Bus idle cycle

14. What is the difference between the opcode and operand? [Nov/Dec 2004][Apr/May 2005]

Opcode is a part of instruction that tells a specific operation, whereas an operand is a part of instruction that represents a value on which the operation is performed.

Ex: MVI A,99H Where MVI A represents opcode and 99H represents operand or data.

15. Why is the address bus unidirectional in 8085?

Microprocessor is the control centre of the system and the address can be generated by it to select the peripherals and memory. So the address bus is unidirectional which carries address from CPU to other devices. Memory and IO devices cannot generate address and it cannot select the microprocessor.

16. Why is the data bus bidirectional?

[Apr/May 2004]

The microprocessor has to fetch the data from memory or input device for processing and after processing the data it has to store the results (data) to memory or output device. Hence the data bus is bidirectional.

17. What are the types of instructions available in 8085?

[Nov/Dec 2005]

- Data transfer instructions
- Arithmetic instructions
- Logical/shift instructions
- Branch instructions
- IO and machine control instructions
- Stack instructions

18. Define an addressing mode?

An addressing mode is a way of specifying the operands in the instruction. 8085 has 5 addressing modes.

- Direct addressing mode
- Indirect addressing mode
- Immediate addressing mode
- Register addressing mode
- Implied addressing mode

19. Explain DAD instruction?

[Apr/May 2005]

DAD – Double addition. It is used to perform addition of two 16-bit numbers.

Ex: DAD D [HL]B[DE]+[HL]

On execution of this instruction, the carry flag is affected.

20. Name the vectored and non-vectored interrupts of 8085 microprocessor?

[Apr/May 2006]

Non-vectored interrupt -> INTR

Vectored Interrupt -> TRAP, RST 7.5, RST 6.5,  
RST 5.5

## *UNIT-II*

1.What are the functional units available in 8086 architecture?

The bus interfacing unit and execution unit are the two functional units available in the 8086 architecture.

2.What are the interrupts of 8086?

The interrupts of 8086 are INTR and NMI. The INTR is general maskable interrupt and NMI is non-maskable interrupt.

3.What is the data and address size in 8086?

The 8086 can operate on either 8-bit or 16-bit data. The 8086 uses 20-bit address to access memory and 16 bit address to access I/O devices.

4.What is masking and why it is required?

Masking is preventing the interrupt from disturbing the current program execution. If the processor should not be interrupted when it is performing an important process then all the interrupts should be masked or disabled. In a processor with multiple interrupts, the lower priority interrupt can be masked so as to prevent it from interrupting the execution of ISR of higher priority interrupt.

5.List the segment registers in 8086?

The segment registers of 8086 are Data segment, Code segment, Stack segment and Extra segment.

6.Explain about DB,DW,DD directives?

DB,DW and DD directives are used to assign names for the variables used within the user program.DB is used for byte variables,DW and DD are used for word and double word type of data.

7.What is the difference between NEAR CALL and FAR CALL?

If NEAR CALL is used in the program means,it specifies that the CALL instruction and the called subroutine are in the same segment. FAR CALL defines that CALL instruction and the called subroutine are in different two segments.

8. Indicate the difference between procedure and macro?

When the procedure is called within the main program, the program control will be transferred to the procedure starting address and start execution of a group of instructions available in the procedure. In macros, whenever macro is called by its name, each time the assembler will insert the defined group of instructions in the main program itself. The program control is not transferred anywhere.

9. Write briefly on LOCK and WAIT for 8086 processor?

[May/June 2007]

LOCK is the bus lock prefix instruction of 8086. If lock instruction is used, microprocessor will set LOCK pin to zero. If this pin is set to 0, the other bus masters will be prevented from gaining the system bus.

If we use the WAIT instruction, the microprocessor will wait until the TEST input pin becomes zero.

9. Explain the function of Execution unit in 8086?

[May/June 2007]

Execution unit contains all registers except instruction pointer. The execution of instructions is controlled by this unit by giving appropriate timing and control signals. ALU and Flag registers are also the part of execution unit.

10. What do you mean by pipelining in 8086?

[Nov/Dec 2006]

During the execution time, the BIU fetches the next instruction or instruction from memory into the instruction queue instead of remaining idle. The BIU continues this process as long as the queue is not full. Due to this, execution unit gets the ready instruction in the queue and instruction fetch time is eliminated. This is the pipelined architecture of 8086.

11. How the 20 bit effective address is calculated in 8086 processor?

[Nov/Dec 2006]

Address conversion mechanism is used to calculate the 20 bit physical address. This physical address is calculated by using segment address and offset address. The segment address and offset address size is 16 bit long.

Ex: segment address -1001

Offset address -5555

To calculate the physical address segment address is shifted left bitwise 4 times and result is added into offset address.

0001 0000 0000 0001  
0010 0000 0000 0010

```

00 0100 0000 0000 0100
000 1000 0000 0000 1000
0001 0000 0000 0001 0000+
0101 0101 0101 0101
0001 0101 0101 0110 0101
-----
1   5   5   6   5   _____

```

Physical address is 15565.

12. What are the different flags in 8086?

[May/June 2006]

Overflow flag(OF)-set if the result is too large positive number, or is too small negative number to fit into destination operand.

Direction Flag(DF)-if set then string manipulation instructions will auto-decrement index registers. If cleared then the index registers will be auto-incremented.

Interrupt –enable Flag(IF)-setting this bit enables maskable interrupts.

Single-step Flag(TF)-if set then single-step interrupt will occur after the next instruction.

Sign Flag(SF)-set if the most significant bit of the result is set.

Zero Flag(ZF)-set if the result is zero.

Auxillary carry Flag(AF)-set if there was a carry from or borrow to bits 0-3 in the AL register.

Parity Flag(PF)-set if parity (the number of “1” bits) in the low-order of the result is even.

Carry Flag(CF)-set if there was a carry from or borrow to the most significant bit during last result calculation.

13. What is the use of Instruction pointer in 8086?

Instruction pointer holds the 16 bit address of the next code byte within the code segment. The value contained in the IP is called effective address or offset. It contains the distance from the base address to the next instruction byte to be fetched.

14. What is the use of PUSHF instruction used in 8086?

It pushes the flag register contents to the top of the stack. No flags are affected.

15. Define XLAT instruction used in 8086?

It translates a byte in AL using a table in memory. The offset address is calculated by adding the bit contents of the AL register and the contents of BX register. BX register contains the starting offset address of the Lookup table. After

execution, corresponding data memory contents of the lookup table are loaded into the AL register.

16. What is DAS instruction?

DAS: Decimal Adjust After Subtraction. This instruction converts the binary result of a SUB or SBB instruction in AL to Packed BCD format. It operates only on AL register.

17. Define assembler directives?

Assembler needs some hints from the programmer in the form of pre-defined alphabetical strings. These strings are called assembler directives.

18. State the function of MIN/MAX pin in 8086?

[May/June 2007]

This is an input of 8086 microprocessor. If it is set to zero, microprocessor will switch to minimum mode of operation. If it is one, microprocessor will switch to maximum mode of operation.

19. Give the function of READY and TEST PINS OF 8086? \_\_\_\_\_

READY: If the signal is low the 8086 enters into wait state. This signal is primarily to synchronize slower peripherals with the microprocessor.

TEST: This signal is only used by the WAIT instruction. If we use the WAIT instruction, the microprocessor will wait until the TEST input pin becomes zero.

20. What are the modes in which 8086 can operate? \_\_\_\_\_

The 8086 can operate on either 8 bit or 16 bit data. The 8086 uses 20 bit address to access memory and 16 bit address to access input output devices.

### *UNIT-III*

#### 1..What is co-processor?

Most microprocessor has limited mathematical processing capability such as addition, subtraction, multiplication and division, they do not evaluate trigonometric, logarithmic and exponential functions. Therefore, specialized processors have been developed to solve this problem. These are called coprocessor.

#### 2.Explain the features of 8087?

Numeric data coprocessor designed using HMOS III technology 40 pin package  
It adds 68 numeric processing instructions and eight 80-bit registers to the microprocessor register set

It can be interfaced to 8086/8088 and 80186/80188

Support seven data types

It includes arithmetic, trigonometric, exponential and logarithmic instructions

8087 can operate in parallel with and independent of the microprocessor

It can the processor when it detects an error or exception

Uses the request/grant lines to gain control of the microprocessor system bus for data transfer

#### 3.What are the advantages of loosely coupled system?

Better system throughput by having more than one processor

Each processor may have a local bus to access local memory or I/O devices so that a greater degree of parallel processing can be achieved.

System structure is more flexible

A failure in one module normally does not cause a breakdown of the entire system

4. Compare loosely coupled and tightly coupled systems?

#### TIGHTLY COUPLED SYSTEM

Closely coupled or shared memory multiprocessor system

Several processors share a common memory

Processors communicate through shared memory

Well suited and more efficient for higher degree of interaction between tasks

#### LOOSELY COUPLED SYSTEM

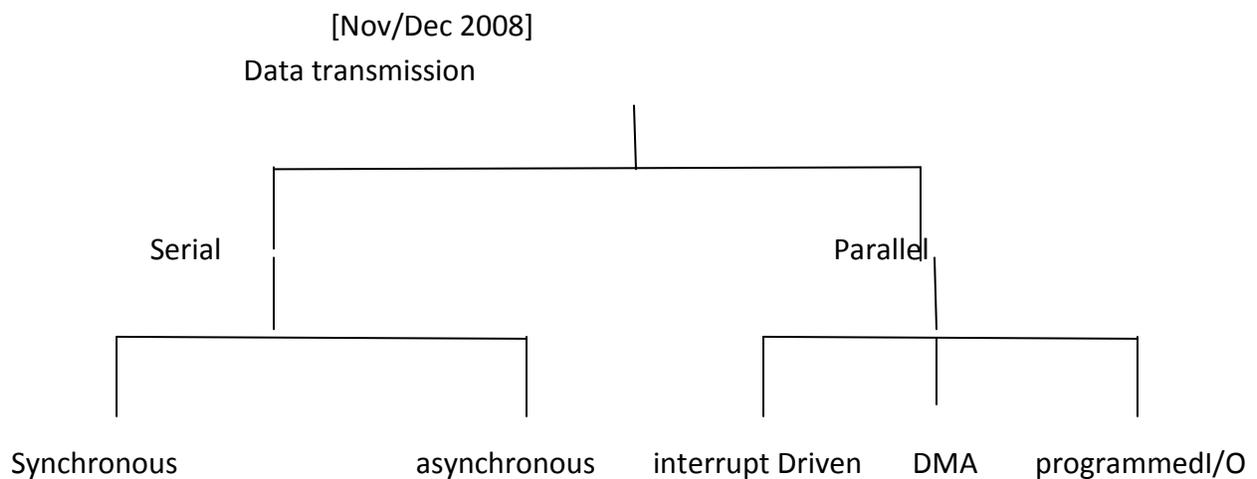
Distributed memory multiprocessors

Each processor has its own local memory

Processors are tied together by switching scheme and communicate through message passing scheme

More efficient when the utilization between tasks is minimal

5. List out three modes of transmission ?



6. List the Bus allocation schemes?

Daisy chaining

Polling method

Independent method

7. What is PSW?

PSW -> Program Status Word

It contain current channel status. It stores the information about source and destination address width, channel activity, Interrupt control and servicing, bus load limit and priority.

8. Define multiprocessor system?

It a multiprocessor system contain two or more components that can execute instructions independently, then the system is called multiprocessor system.

9. What are the advantages of the multiprocessor system?

[May/June 2007]

- Execution the performance
- Improve the performance
- Trouble shooting is easy
- Servicing preparing cost is less
- Flexibility is more
- Reliability is more
- System expansion is easy

10. Disadvantages of multiprocessor system?

- Bus contention
- Interprocess communication
- Resource sharing

11. Explain why the processor utilization rate can be improved in a multiprocessor system by a instruction queue?

[May/June 2008]

The processor has to fetch the instruction from memory before decode and execute it. Fetching the instruction from memory takes considerable amount of time and processor has to wait and processor has to wait during this time, reducing its utilization rate. The instruction queue mechanism before the execution so that processor need not have to wait for instruction fetch, improving the utilization rate.

12. What are the multiprocessor configuration methods?

- Loosely coupled multiprocessor configurations
- Closely coupled multiprocessor configurations

13. What is SYS BUS?

It specifies the size of system bus when SYS BUS=0 it indicates size of system bus 8 bit.

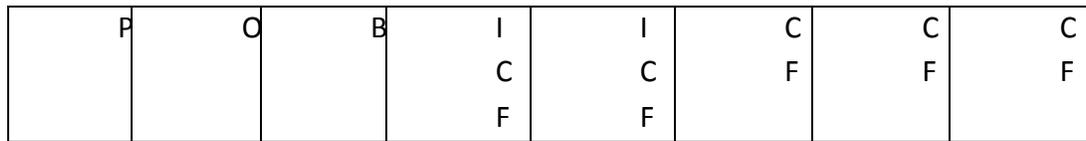
SYS BUS=1 it indicates size of system bus in 16 bit.

14. Define CCW?

CCW->channel command word

CCW indicates the action to be taken by the channel.

CCW format



P->parity bit

O->zero

B->Bus load limit

ICF->Interrupt control field

CF->command field

15. List the channel registers in 8089?

Each channel has an identical set of registers. Each set is divided into 2 groups.

Pointer(20 bit)-GA,GB,GC,TP,PP

Register(16 bit)-IX,BC,MC,CC GA,GB->source and destination pointers

GC->use the base address

TP-> task pointer

PP->parameter pointer

IX->index register

BC->byte counter

MC->mask compare operation

16. What is CCP?

CCP->channel control pointer

CCP cannot be manipulated by user. It stores address of the.

17. What is the ICF?

ICF->Interrupt Control Field

This is used to enable or disable interrupt request and remove previous request.

00->ignore

01->remove interrupt request

10->enable interrupt

11->disable interrupt

18. List the features of IOP?

An IOP can fetch and execute its own instruction

Instruction one specially designed for I/O processing

It performs arithmetic and logic operations, branches, searches and translation.

IOP does all work involved in I/O transfer including device setup, programmed I/O and DMA operations.

19. How DMA is initiated?

When the I/O device needs a DMA transfer, it will send a DMA request signal to the DMA controller. The DMA controller in turn sends a HOLD request to the processor. When the processor receives a HOLD request, it will drive its tri-stated pins to high impedance state at the end of current instruction execution and send an acknowledge signal to the DMA controller. Now the DMA controller will perform DMA transfer.

20. What is GPIB?

GPIB is the General Purpose Interface Bus. It is used to interface the test instruments to the system controller.

## UNIT-IV

1. Why 8255 IC is called programmable device?

8255 IC is called programmable peripheral interface since its internal ports namely port A, port B and port C can be programmed to act either as input port or output port. Also 8255 can be programmed to operate in BSR mode or IO mode.

2. What are the operating modes of 8255?

It can be operated in

BSR (Bit Set and Reset) mode

IO mode

Mode 0 - Simple IO for ports A, B and C

Mode 1 - Handshake IO for port A and B with port C as control port

Mode 2 - Bidirectional data transfer

3. If the memory is having 12 address lines and 8 data lines then calculate the memory locations or number and word length?

$$\text{No of registers} = 2^N = 2^{12} = 4096$$

$$\text{Memory location} = 2^N = 2^{12} = 4096$$

$$\text{Word length} = M \text{ bit} = 8 \text{ bit}$$

4. Define PPI?

[Nov/Dec 2004]

PPI is a programmable peripheral interface (IC 8255). It is a programmable parallel IO device that can be programmed to transfer data between microprocessor and the IO devices. It has three ports port A, B and C can be programmed to operate in different modes.

5. Specify the bit that differentiates between the BSR mode and IO mode in 8255?

[Nov/Dec 2004]

The bit D7 of the control word differentiates between BSR and IO mode.

If D7 = 1 → IO mode

D7 = 0 → BSR mode

6. What are the differences between serial synchronous data transfer and asynchronous data transfer?

Synchronous Data Transfer

Both the transmitter & receiver operates with the same clock synchronously

High speed data transfer

Block of characters transmitted at a time

Synchronous characters are sent with each group of data

#### Asynchronous Data Transfer

Transmitter and the receiver need not have the same clock

Low speed data transfer

One character at a time

Start and stop bits are to be added to each character

7. What are USART?

[Nov/Dec 2004]

Universal Synchronous Asynchronous Receiver Transmitter. It is a programmable device used to convert parallel data in to serial form and vice versa. This IC is used to interface a microprocessor to a modem through RS232c standard serial interface.

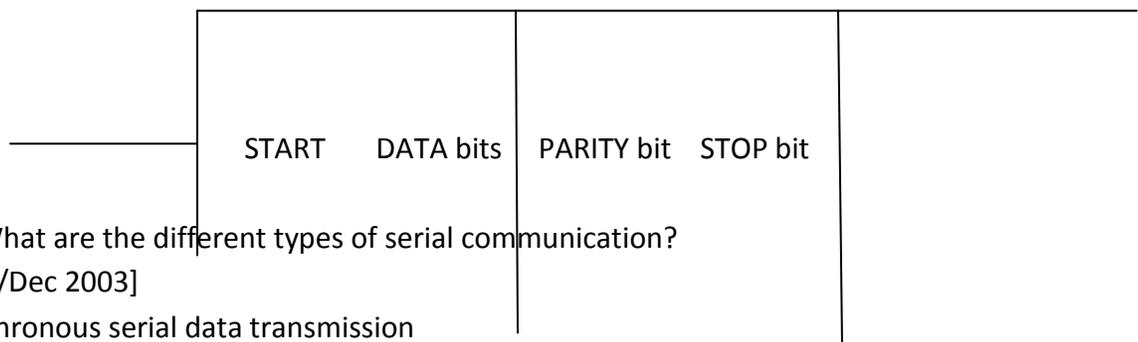
8. Differentiate between half duplex and full duplex transmission?

[Apr/May 2005]

In duplex transmission data flow in both directions. If the transmission goes one way at a time it is called half duplex. If the transmission goes in both the ways simultaneously it is called full duplex.

9. What are framing?

Framing is a process of converting the information to be transmitted through asynchronous serial data transmission into standard frames. Each frame is made of an active low START bit followed by data to be transmitted, parity bit for error detection and terminated by active high STOP bits. The format is as follows:



10. What are the different types of serial communication?

[Nov/Dec 2003]

Synchronous serial data transmission

Asynchronous serial data transmission

11. What are the functions performed by 8251?

[Apr/May 2005]

It converts parallel data in to serial data and vice versa

Data transmission can be either synchronous or asynchronous

It is used to interface MODEM and establish serial communication through MODEM over telephone lines

12. What are the features of 8259 PIC?

[Nov/Dec 2004]

8259 can manage 8 interrupt

It can vector an interrupt request anywhere in the memory map

It can mask each interrupt request individually

It can read the status of the pending interrupts, in-service interrupts and masked interrupts

It can be set up to accept edge triggered interrupts

In cascaded mode it can handle 64 interrupts

It can be interfaced to 8085 or 8086

13. 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.

14. How many registers are there in 8259?

4 registers. Interrupt Request Register (IRR), Priority Resolver (PR), Interrupt Service Register (ISR), and Interrupt Mask Register (IMR).

15. What are the methods available for error correction during serial data transmission?

[Nov/Dec 2005]

Parity bit checking

Check sum

Cyclic Redundancy Check (CRC)

Hamming code method

16. What is the difference between two key lockout and N-key rollover modes in 8279?

[Apr/May 2005]

Two key lockout mode: If two keys are depressed within the denounce cycle it is a simultaneous depression. Neither key will be recognized until one of the is released. The final key released will be recognized and entered.

17. What are the functions performed by 8279?

[Apr/May 2005]

Key board scanning  
Key code generation  
Informing the key depression to CPU  
Storing the display codes  
Display refreshing  
Output display code's to LED's

18. What is DMA operation? Give its advantage.

[Nov/Dec 2005][Nov/Dec 2004]

DMA stands for Direct Memory Access. In order to transfer to bulk amount of data between two high speed devices like memory and IO device with out the intervention of CPU. The advantage is faster data transfer.

19. What is cycle stealing mode of DMA transfer? [Apr/May 2005]

DMA data transfer between two devices will be performed during the execution of any instruction by the CPU by stealing few of the machine cycles. This mode is used when the speed of two devices involved in data transfer is mismatching.

20. What are the different registers available in DMA controller(8237)?

[Nov/Dec 2005]

Base address register  
Base word count register  
Current address register  
Current word count register  
Temporary address register  
Temporary word count register  
Status register  
Command register  
Temporary register  
Mode register  
Mask register  
Request register

21. Which types of decoding requires minimum hardware?[May/June 2008]

Linear decoding requires minimum hardware. It reduces the cost of decoding circuit. It is also called partial decoding.

## *UNIT-V*

### 1. Compare microprocessor and microcontroller?

Microprocessor is a program control semiconductor device which fetch instruction from memory and execute that instructions. Also it performs various arithmetic and logic operations.

Microcontroller contains the circuitry of microprocessor and in addition it has built in ROM, I/O devices, timers and counters. It has one or two instructions to move data between memory and CPU. It has many bit handling instructions.

### 2. Define microcontroller?

Microcontroller contains the circuitry of microprocessor and in addition it has built in ROM, I/O devices, timers and counters. It has one or two instructions to move data between memory and CPU. It has many bit handling instructions.

### 3. Define Timer and list the modes of Timer ?

Timer -> Timer is used to generate time delay.

Timer mode 0          Timer mode 1

Timer mode 2          Timer mode 3

### 4. What are the features of 8051 microcontroller?

8 bit microprocessor in 40 pin DIP package

4096 bytes on-chip program memory

128 bytes on-chip data memory

Four register banks

128 user defined software flags

64KB each program and external PAM addressability

Two multiple mode, 16 bit Timers/Counters.

5. What are the different groups of instructions supported by 8051?

Data transfer instructions, Arithmetic instructions, Logical instructions, Branching instructions and bit manipulation instructions,

6. List the addressing modes of 8051?

[Nov/Dec 2007]

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

7. What are the call statements in 8051?

There are two subroutine CALL instructions. They are

LCALL (Long CALL)

ACALL (Absolute CALL)

8. Write about jump statements?

LJMP (Long jump-address 16)

AJMP (Absolute jump-address 11)

SJMP (Short jump-relative address)

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

MOV A,RO

CPL A

INC A

10. What is the purpose of EA/V<sub>pp</sub> pin of 8051?

The 8051 can execute program in external memory, only if this external access pin is low. For execution of programs in internal memory, it must be tied high. This pin also receives 21V for programming the on-chip EPROM.

11. What is DPTR in 8051?

This is the data pointer register. This 16 bit register contains a higher order byte (DPH) and the lower order byte (DPL) of a 16 bit data RAM register. It is accessed as a 16 bit register or two 8 bit registers.

12. Differentiate RRA and RRCA instruction in 8051 microcontroller? [Nov/Dec 2006]

RR A

Function: Rotate accumulator right

Description: The 8 bits in the accumulator are rotated one bit to the right. Bit 0 is rotated into the bit 7 position. No flags are affected.

RRC A

Function: Rotate accumulator right through carry flag

Description: The 8 bits in the accumulator and the carry flag are together rotated one bit to the right. Bit 0 moves into the carry flag; the original value of the carry flag moves into the bit 7 position. No other flags are affected.

13. What is the purpose of PSEN pin of 8051?

It is Program Store Enable. This pin acts as a strobe to read external program memory. This goes low during external program memory access.

14. What are the signals handled in ADC interfacing? [Nov/Dec 2003]

CE/LOAD	_____	_____
IOR	_____	
LBEN	_____	
HBEN	_____	_____

15. What are the operating modes of 8253?

[May/June 2009]

Mode definition

Interrupt on terminal count:-

Normal operation

Gate disable

New count

Hardware retriggerable one-shot:-

Normal operation

Retriggering

New count

Rate generator

Normal operation

Gate disable

New count

Square wave rate generator

Normal operation

Gate disable

New count

Software triggered strobe:-

Normal operation

Gate disable

New count

Hardware triggered strobe (retriggerable)

Normal operation

Retriggering

New count

## 16. Give examples for Micro controller?

- Z80, Intel MSC51 & 96, Motorola are the best examples of Microcontroller.

## 17. What is meant by cross-compiler?

- A program runs on one machine and executes on another is called as cross-compiler.

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

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

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

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

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

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

# **PART B**

## **16 MARK QUESTIONS**

### **CS42- MICROPROCESSORS AND MICROCONTROLLERS**

#### **UNIT I**

1. With a neat Block diagram explain the architecture of an 8085 Microprocessor?
2. Explain the instruction set in 8085 Microprocessor?
3. Explain the various logical and arithmetic instructions available in 8085 Microprocessor?
4. Explain the addressing modes of 8085 Microprocessor?
5. a. Write a program to convert 8 bit binary no to BCD?  
b. Describe the signal present in 8085?

#### **UNIT 2**

1. Explain the internal block diagram of 8086?
2. Describe the procedures and macros of 8086?
3. Discuss the various addressing modes of 8086 Microprocessor?
4. Explain the Assembler Directives used in 8086?
5. Explain the instruction set in 8086?

#### **UNIT 3**

1. Describe Multi processor configuration?
2. Explain with neat diagram of I/O processor (8089)?
3. Write briefly about coprocessor?
4. Explain the block diagram of 8087 Numeric data processor?
5. With a neat sketch, explain communication between CPU and 8089 I/O processor?

#### **UNIT 4**

1. With neat block diagram explain the DMA controller?
2. With a neat block diagram explain the architecture of USART?
3. With a neat block diagram explain the 8279 keyboard display the processor?
4. Discuss the features of Intel programmable timer and different modes of operations?
5. With a neat sketch and explain the operation of an interrupt controller (8259)?

#### **UNIT 5**

1. Give the pin detail of an 8051 microprocessor?
2. With a suitable block diagram explain the architecture of 8051 microcontroller?
3. Explain 8051 instruction set?
4. List the addressing modes of 8051 and give a specific example for each of them?
5. Explain the interfacing of LCD with 8051 microcontroller in detail?