

# 19ECT211- MICROPROCESSOR AND MICROCONTROLLERS

## Question Bank

### UNIT -1

#### PART- A

1. Define microprocessors?  
A semiconductor device(integrated circuit) manufactured by using the LSI technique. It includes the ALU, register arrays, and control circuits on a single chip.
2. What is an Assembler?  
A computer program that translate an assembly language program from mnemonics to the binary machine code of a computer.
3. What do you mean by address bus?  
A group of lines that are used to send a memory address or a device address from the MPU to the memory location or a peripheral. The 8085 microprocessor has 16 address lines.
4. How many memory locations can be addressed by a microprocessor with 14 address lines?  
The 8085 MPU with its 14-bit address is capable of addressing  $2^{14}=16,384$  (ie) 16K memory locations.
5. Why are the program counter and the stack pointer 16-bit registers?  
Memory locations for the program counter and stack pointer have 16-bit address. So the PC and SP have 16-bit registers.
6. Explain the function of ALU and IO/M signals in the 8085 architecture?  
The ALU signal goes high at the beginning of each machine cycle indicating the availability of the address on the address bus, and the signal is used to latch the low-order address bus. The IO/M signal is a status signal indicating whether the machine cycle is I/O or memory operation. The IO/M signal is combined with the RD and WR control signals to generate IOR, IOW, MEMW, MEMR. 18. If the 8085 adds 87H and 79H, specify the contents of the accumulator and the status of the S, Z, and CY flag?  
The sum of 87H and 79H=100H. Therefore, the accumulator will have 00H, and the flags will be S=0, Z=1, CY=1.
7. What is an instruction set?  
The entire group of instructions, determines what functions the microprocessor can perform is called instruction set.
8. Define Opcode and operand?  
The operation to be performed is called Opcode. The data to be operated is called operand.

9. Write instructions to load the hexadecimal numbers 65H in register C, and 92h in the accumulator A .Display the number 65H at PORT0 and 92H at PORT1?

```
MVI C, 65H
MVI A, 92H
OUT PORT1 ; DISPLAY 92H
MOV A, C ; COPY C INTO A FOR DISPLAY
OUT PORT0 ; DISPLAY 65H
HLT
```

10. Explain priority interrupts of 8085?

The 8085 microprocessor has five interrupt inputs. They are TRAP, RST7.5, RST 6.5, RST 5.5, and INTR. these interrupts have a fixed priority of interrupt service. If two or more interrupts go high at the same time, the 8085 will service them on priority basis. The TRAP has the highest priority followed by RST7.5, RST6.5, and RST5.5. The p r i o r i t y of interrupts in 8085 is shown in the table

#### **PART B:**

1. 8085 architecture
2. Instruction set and addressing modes
3. Assembler directives
4. Interrupts of 8085 and 8086
5. Assembly language programming

## UNIT-2

### PART A

1. Define Memory mapped I/O?  
Instead of a memory register, if an output device is connected at the address, the accumulator contents will be transferred to the output device. This is called memory mapped I/O
2. What is an interrupt I/O?  
The interrupt I/O is a process of data transfer whereby an external device or a peripheral can inform the processor that it is ready for communication and it requests attention
3. What the two categories of an interrupt?  
Four Maskable interrupt  
One Non Maskable interrupt
4. What are the signals used by the DMA controller?  
The Signals are:
  - o HLDA
  - o DMA request
  - o DMA acknowledge
  - o AEN – address enable
  - o ADSTB- address strobe
5. Give the additional features of 8259A controller?  
Input triggering  
Interrupt Status  
Poll Method
6. How the signals of the 8237 are classified?  
The signals are classified in to two groups.
  - i. One group of signals are used for interfacing with the MPU
  - ii. Second group for communicating with the peripherals.
  - iii.
7. What is the purpose of 8255 PPI?  
The 8255A is widely used, programmable, parallel I/O device .It can be programmed to transfer data under various conditions, from simple I/O to interrupt I/O.
8. What is the purpose for scan section in keyboard interface?  
The scan section has a scan counter and four scan lines. These scan lines can be decoded using a 4-to-16 decoder to generate 16 lines for scanning.

9. What is USART?

USART is an integrated circuit. It is a programmable device its function and specifications for serial I/O can be determined by writing instructions in its internal registers.

10. To interface an A/D converter with the microprocessor, what does the microprocessor do? The microprocessor should:

- Send a pulse to the start pin
- Wait until the end of the conversation
- Read the digital signal at the input port

## **Part B**

1. Memory mapped and IO mapped IO
2. D/A and A/D converter
3. DMA Controller
4. Case studies: Interfacing with microcontroller
5. Interrupt controller

## UNIT 3

1. List out some of the features of the 8051?

ROM - 4K bytes  
RAM - 128 bytes  
Timer - 2 no  
I/O Pins - 32  
Serial Port - 1  
Interrupt sources – 6

2. What Are The Types Of Interrupts In 8051?

- o External interrupt 0 (IE0) has highest priority among interrupts.
- o Timer interrupt 0 (TF0)
- o External interrupt 1 (IE1)
- o Timer interrupt 1 (TF1) has lowest priority among other interrupts.
- o Serial port Interrupt
- o Reset

3. What is an Interrupt service routine?

When micro controller is under sudden interrupt, it will call ISR (Interrupt service routine) that will store the address of current memory address and takes the control to new interrupt memory address. After the interrupt, the control will transfer back to its previous address.

Ans: A subroutine is a program that may be used many times in the execution of a larger program.

4. Give the comparison between microprocessor and microcontroller

5. Explain the PSW in 8051 microcontroller

Flag register in 8051 is called as program status word (PSW). This special function register PSW is also bit addressable and 8 bit wide means each bit can be set or reset independently.

6. Compare the memory mapped I/O and Standard mapped I/O

<b>Memory mapped I/O</b>	<b>Standard mapped I/O</b>
a) 16 bit address is allotted to an I/O device	a) 8 bit address is allotted to an I/O device
b) The devices are accessed by memory read or memory write cycle	b) The devices are accessed by I/O 8 read or I/O write cycle
c) All instructions related to memory can be used for data transfer	c) Only IN and OUT instructions can be used for data transfer
d) A large number of I/O ports can be interfaced.	d) Only 256 ports can be interfaced

7. What Is Special Function Registers (sfr)?

The memory addresses from 80H to 0FFH are called SFR. These are 128 bytes registers specially designed for interrupts and few other operations.

8. What is the necessity of interfacing DAC with microcontroller?

In many applications, the microcontroller has to produce analog signals for controlling certain analog devices. Basically, the microcontroller can produce only digital signals. In order to convert the digital signal to analog signal a Digital to Analog Converter has to be employed.

9. Define baud rate.

Baud rate is used to indicate the rate at which data is being transferred. Baud rate =  $1/\text{Time for a bit cell}$ .

10. Compare polling and interrupt.

The 8051 microcontroller can do only one task at a time. In polling, the microcontroller continuously checks each port one by one according to the priority assigned to the ports, and if any device requires service, then it provides it. In interrupt, when the device requires service, it sends the request to microcontroller and the controller then provides service to it. So essentially, the difference is that in polling, microcontroller has to check continuously whether any device is asking for request, while in interrupt the device itself sends the request and the controller satisfies it. And because microcontroller is freed from the task of checking each port, it can do other work.

**PART-B**

1. Special Function registers of 8051
2. INTERRUPTS OF 8051
3. Explain assembly language programming with example
4. Architecture of 8051
5. I/O Ports of the 8051 and the Instruction set

## UNIT-4

### PART A

1. What are the applications of 8051 microcontroller?  
Industrial control (process control)  
Motor speed control (stepper motor control)  
Peripheral devices (printer)  
Standalone devices (colour Xerox machine)  
Automobile applications (power steering)  
Home applications (washing machine)
2. What are the different types of methods used for data transmission?  
The data transmission between points involves unidirectional or bi-directional transmission of meaningful digital data through a medium. There are basically three modes of data transmission (a) Simplex (b) Duplex (c) Half Duplex In simplex mode, data is transmitted only in one direction over a single communication channel.
3. What are the various programmed data transfer methods?
  - i) Synchronous data transfer
  - ii) Asynchronous data transfer
  - iii) Interrupt driven data transfer
4. What is an USART?  
USART stands for universal Synchronous / Asynchronous Receiver / Transmitter. It is a programmable communication interface that can communicate by using either synchronous or asynchronous serial data.
5. List the major components of the Keyboard/ Display interface.
  - a. Keyboard section
  - b. Scan section
  - c. Display section
  - d. CPU interface section
6. What are the tasks involved in keyboard interfacing?  
The tasks involved in keyboard interfacing are sensing a keyboard interfacing are sensing a key actuation, de-bouncing the key and generating key codes (decoding the key). These tasks are performed in software if the keyboard is interfaced through ports and they are performed by hardware if the keyboard is interfaced through 8279.
7. What is scanning in keyboard and what is scan time?  
The process of sending a zero to each row of a keyboard matrix and reading the columns for key actuation is called scanning. The scan time is the time taken by the processor to scan all the rows one by one starting from the first row and coming back to the first row.

8. What is the purpose for the 8255 PPI?

The 8255A is a widely used, programmable, parallel I/O device. It can be programmed to transfer data under various conditions, from simple I/O to interrupt I/O.

9. What is the use of modem control unit in 8251?

The modem control unit handles the modem handshake signals to coordinate the communication between the modem and the USART.

10. What are the modes of operation used in 8253?

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

1. Mode 0 (Interrupt on terminal count)
2. Mode 1 (Programmable monoshot)
3. Mode 2 (Rate generator)
4. Mode 3 (Square wave generator)
5. Mode 4 (Software triggered strobe)
6. Mode 5 (Hardware triggered strobe)

#### **PART-B**

1. Interface 8051 to external ROM and RAM and explain how 8051 access it
2. Interface 8051 to stepper motor and write an assembly language program to rotate the motor first in +4 steps and then in -6steps.
3. Explain the timer and counter in 8051
4. Interrupt programming of 8051
5. Comparison of microprocessor and microcontroller



## UNIT- 5

### PART A

1. What is data acquisition system in microcontroller?

A data acquisition system is a system that includes measurement devices, sensors, a computer, and data acquisition software. A data acquisition system is used for acquiring, storing, visualizing, and processing data. This involves collecting the information required to understand electrical or physical phenomena

2. What is data acquisition interface?

Interface provides a wide range of data acquisition instrumentation that is easily paired with our force measurement products. By definition, a data acquisition system is a collection of components used to acquire data via analog signals and converting them to digital form for storage, research, and analysis

3. What is a microcontroller based temperature control system?

Microcontroller takes signal from temperature sensor and compare with pre-set value of temperature then take decision when heating device or cooling device would be turned on and the duration of maintained temperature in system.

4. What are the applications of temperature control system?

Temperature controllers are used in various applications, including HVAC, refrigeration, ovens, and process control systems. They are designed to control precise temperature, minimize energy usage, and prevent temperature overshoot or undershooting.

5. What is motor control in microcontroller?

DC motor when interfaced with a microcontroller, can control the speed of motor, can control the direction of rotation, can also do encoding of the rotation made by DC motor i.e. keeping track of how many turns are made by your motors etc. DC motors are no less than a stepper motor.

6. What is PIC microcontroller in detail?

The PIC microcontroller is a single-chip computer with RAM, ROM, I/O ports and a CPU. The PIC16F73 has features like a RISC CPU, 4K bytes of flash memory, 192 bytes of RAM, three I/O ports and a built-in oscillator.

7. What is a PIC and its features?

The first Peripheral Interface Controller (PIC®) was developed in 1975. It was a 16-bit core, created to handle the input/output tasks of larger Central Processor Units (CPUs) to improve overall system performance. It offered Read-Only Memory (ROM), Random Access Memory (RAM), and a simple but efficient CPU

8. List the applications of PIC microcontroller

9. List the advantages of the ARM Processor

Lower power consumption: Ideal for mobile and battery-powered devices.

Cost efficiency: Generally cheaper to produce due to simpler design.

Heat efficiency: Generates less heat, reducing the need for cooling solutions.

Market prevalence in mobile devices: Dominant in smartphones and tablets.

10. Is ATmega a processor?

The ATmega328 is a single-chip microcontroller created by Atmel in the megaAVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core

### **Part B**

1. Explain the speed control system application of 8051

2. Give in detail about the Traffic light system of 8051

3. Elevator system of 8051

4. Architecture of PIC Microcontroller

5. Explain in detail about the ARM Processor and its features with block diagram

6. ATmega in detail