

Th.3- MICROPROCESSOR & MICROCONTROLLER

(Common ETC, AE&I, CSE & IT)

Theory	5 Periods per week	Internal Assessment	20 Marks
Total Periods	75 Periods	End Sem Exam	80 Marks
Examination	3hours	Total Marks	100Marks

A. Chapter wise Distribution of periods with Total periods

Sl.No.	Topics	Periods
1.	Microprocessor(Architecture and Programming-8 bit-8085)	15
2.	Instruction Set and Assembly Language Programming(8 bit)	15
3.	TIMING DIAGRAMS	07
4.	Microprocessor Based System Development Aids	11
5.	Microprocessor (Architecture and Programming-16 bit-8086)	12
6.	Microcontroller (Architecture and Programming-8 bit)	15
TOTAL		75

B. Rationale:

The Microprocessor control has taken predominance over other types of control quite some time past. Starting from Electrical Power plant to consumer electronics this tiny chip finds extensive uses. As such Microprocessors have made pervading influence on our lives. This field is developing so rapid that it is difficult to keep track with the changes. Under this subjects Architecture and instruction sets of 8 bit and 16 bit processor have been discussed. Some applications have been included through the interfacing chips. Microcontroller (MC) may be called computer on the chip since it has basic features of a microprocessor with internal ROM, RAM, Parallel and serial ports within a single chip. Or we can say microprocessor with memory and ports is called as a microcontroller. Microcontroller is a programmable digital processor with necessary peripherals. Both microcontrollers and microprocessors are complex sequential digital circuits meant to carry out job according to the program / instructions. Sometimes analog input/output interface makes a part of microcontroller circuit of mixed mode(both analog and digital nature).

C. Objective:

After completion of this course the student will be able to:

1. The students will able to differential between 8085 microprocessor &types of Bus.
2. Describe the Architecture & pin diagram of 8085 microprocessor.
3. Comprehend different instructions of 8085 microprocessor &addressing modes.
4. Write instructions under different addressing modes.
5. Discuss assembler & basic assembler directives.
6. Describe types of assembly language programs and write programs.
7. Explain the timing diagrams of different instructions.
8. State the functions of the interfacing chips like 8255, etc.
9. Explain the delay subroutine &calculate the delay by using one, two or three registers.
10. Explain ADC & DAC?&use of ADC & DAC modules
11. Write a program for traffic light control &stepper motor control.
12. Know about 16-bit microprocessor.

D. Detailed Contents:

Unit-1:Microprocessor (Architecture and Programming-8 bit-8085)

- 1.1 Introduction to Microprocessor and Microcomputer & distinguish between them.
- 1.2 Concept of Address bus, data bus, control bus & System Bus
- 1.3 General Bus structureBlockdiagram.
- 1.4 Basic Architecture of 8085 (8 bit) Microprocessor
- 1.5 Signal Description (Pin diagram) of 8085 Microprocessor
- 1.6 Register Organizations,Distinguish between SPR & GPR, Timing & Control Module,
- 1.7 Stack, Stack pointer & Stack top.
- 1.8 Interrupts:-8085 Interrupts, Masking of Interrupt(SIM,RIM)

Unit-2: Instruction Set and Assembly Language Programming

- 2.1 Addressing data & Differentiate between one-byte, two-byte &three-byte instructions with examples.
- 2.2 Addressing modes in instructions with suitable examples.
- 2.3 Instruction Set of 8085(Data Transfer, Arithmetic, Logical, Branching, Stack& I/O , Machine Control)
- 2.4 Simple Assembly Language Programming of 8085
 - 2.4.1 Simple Addition & Subtraction
 - 2.4.2 Logic Operations (AND, OR, Complement 1's & 2's) & Masking of bits
 - 2.4.3 Counters & Time delay (Single Register, Register Pair, More than Two Register)
 - 2.4.4 Looping, Counting & Indexing (Call/JMP etc).
 - 2.4.5 Stack & Subroutinesprogrames.
 - 2.4.6 Code conversion, BCD Arithmetic & 16 Bit data Operation, Block Transfer.
 - 2.4.7 Compare between two numbers
 - 2.4.8 Array Handling (Largest number & smallest number in the array)
- 2.5 Memory & I/O Addressing,

Unit-3: TIMING DIAGRAMS.

- 1.1 Define opcode, operand, T-State, Fetch cycle, Machine Cycle, Instruction cycle & discuss the concept of timing diagram.
- 1.2 Draw timing diagram for memory read, memory write, I/O read, I/O write machine cycle.
- 1.3 Draw a neat sketch for the timing diagram for 8085 instruction (MOV,MVI,LDA instruction).

Unit-4 Microprocessor Based System Development Aids

- 4.1 Concept of interfacing
- 4.2 Define Mapping &Data transfer mechanisms - Memory mapping & I/O Mapping
- 4.3 Concept of Memory Interfacing:- Interfacing EPROM & RAM Memories
- 4.4 Concept of Address decoding for I/O devices
- 4.5 Programmable Peripheral Interface: 8255
- 4.6 ADC & DAC with Interfacing.
- 4.7 Interfacing Seven Segment Displays
- 4.8 Generate square waves on all lines of 8255
- 4.9 Design Interface a traffic light control system using 8255.
- 4.10 Design interface for stepper motor control using 8255.

Unit-5 Microprocessor (Architecture and Programming-16 bit-8086)

- 5.1 Register Organisation of 8086

- 5.2 Internal architecture of 8086
- 5.3 Signal Description of 8086
- 5.4 General Bus Operation & Physical Memory Organisation
- 5.5 Minimum Mode & Timings,
- 5.6 Maximum Mode & Timings,
- 5.7 Interrupts and Interrupt Service Routines, Interrupt Cycle, Non-Maskable Interrupt, Maskable Interrupt
- 5.8 8086 Instruction Set & Programming: Addressing Modes, Instruction Set, Assembler Directives and Operators,
- 5.9 Simple Assembly language programming using 8086 instructions.

Unit-6 Microcontroller (Architecture and Programming-8 bit):-

- 6.1 Distinguish between Microprocessor & Microcontroller
- 6.2 8 bit & 16 bit microcontroller
- 6.3 CISC & RISC processor
- 6.4 Architecture of 8051 Microcontroller
- 6.5 Signal Description of 8051 Microcontrollers
- 6.6 Memory Organisation-RAM structure, SFR
- 6.7 Registers, timers, interrupts of 8051 Microcontrollers
- 6.8 Addressing Modes of 8051
- 6.9 Simple 8051 Assembly Language Programming Arithmetic & Logic Instructions , JUMP, LOOP, CALL Instructions, I/O Port Programming
- 6.10 Interrupts, Timer & Counters
- 6.11 Serial Communication
- 6.12 Microcontroller Interrupts and Interfacing to 8255

Coverage of Syllabus upto Internal Exams (I.A.)

Chapter 1,2,3,4

Books Recommended

1. *Microprocessor architecture, programming & application with 8085* by R.S. Gaonkar, Penram International Publishing. (India) Pvt. Ltd.
2. *The 8051 Microcontroller & Embedded Systems* by Mazidi & Mazidi, - Pearson publication
3. *Advanced Microprocessor and Peripherals (Architecture, Programming & Interfacing)* by A.K. Roy & K.M. Bhurchandi, - TMH Publication
4. *Microprocessor & Microcontroller* by N.SenthliKumar, M.Sarvanan, S.Jeevananthan, S K Shah- OXFORD
5. *Microprocessor & Microcontroller* by R.S. Kaler, IKI Publishing
6. *Microprocessor & its application* by B.Ram, Dhanpat rai
7. *Microcontroller, Theory and application* by Ajaya V. Deshmukh. TMH