

Course Name: Microprocessor & Microcontroller

Course Code: EE-504C

Credit: 3

Prerequisites:

Sl. No.	Subject	Description	Level of Study
01	Digital Electronics Circuits	Data and number system, Boolean algebra, Combinational and Sequential circuits,.	3 rd Sem

Course Objective:

- To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
- To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
- To provide strong foundation for designing real world applications using microprocessors and microcontrollers.

Course Outcomes:

At the end of the course, a student will be able to:

1. **Assess and solve** basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.
2. **Apply** knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.
3. **Compare** accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.
4. **Analyze** assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.
5. **Design** electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
6. **Evaluate** assembly language programs and download the machine code that will provide solutions real-world control problems.

CO- PO mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	-	2	-	2	-	2	-	2	-	2	-
2	2	-	2	-	2	3	-	1	3	-	1	-
3	2	2	-	2	-	3	1	2	-	2	3	2
4	3	-	3	-	2	-	-	1	3	2	-	-
5	2	2	2	2	3	2	1	2	-	3	2	3
6	-	-	2	-	3	-	-	-	2	-	2	-

Correlation levels 1, 2 or 3 as defined above: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) and “-” if there is no correlation.

Syllabus:

Module no:	Topics	Relevant COs
Module I	Introduction to Computer architecture: Architecture of a typical Microprocessor, Bus configuration, The CPU module, ROM & RAM families, Introduction to assembly language & machine language programming, Instruction set of typical microprocessor (e.g. 8085), Subroutine & stack, Timing diagram, Memory Interfacing, Interfacing input output- port, Interrupt & interrupt handling, Serial & parallel data transfer scheme, Programmed & interrupt driven data transfer, Direct memory access, Programmable peripheral devices, Programmable interval timer, Analog input-output using AD & DA converter.	CO1, CO2, CO4, CO5.
Module II	Assembly language programme of a typical Microprocessor: Use of compilers, assembler, linker & debugger.	CO4.

Module III	Basic 16 bit Microprocessor (e.g. 8086): Architecture, Min-max mode.	CO1, CO2, CO3.
Module IV	Introduction to microcontroller: Architecture & instruction set of a typical microcontroller (e.g. PIC16F84 device), Feature of popular controller (processor 8031/8051), its programming & interfacing.	CO1, CO2, CO3, CO4, CO6.

Lecture Plan:

No. of Classes required	Details of Coverage	Text/Reference(s)
1	Introduction and brief history of Microprocessors.	1, 2, 3
2	Introduction to assembly language, brief concept of compiler, assembler, linker and debugger.	1, 2
5	Architecture of 8085 Microprocessor, CPU module, Bus Configuration of 8085	1, 2
5	Instruction Set of 8085, some basic examples	1, 2
6	ROM and RAM families, memory interfacing, Interfacing I/O ports, Timing Diagrams, 8155 and 8255 programmable peripheral devices.	1, 2
3	Counters and Time Delays, Stack and Subroutines	1, 2
3	Interrupt and Interrupt Handling, 8259-Programmable Interrupt Controller	1, 2
1	DMA and DMA Controller -8237	1, 2
1	Programmable Interval Timer-8253/8254	1, 2
2	A/D and D/A Converter	1, 2
1	Programmable Keyboard and Display I/O Interface-8279	1, 2
1	Serial and Parallel Data Transfer	

		1, 2
3	Introduction to 16 bit 8086 Microprocessor, its architecture, Min-Max Mode.	2, 3, 4
6	Introduction to Microcontrollers, comparison with Microprocessor, Architecture and programming of 8051 microcontroller & brief introduction to PIC Microcontroller.	2, 4

Recommended Books:

1. Ramesh Gaonkar. Microprocessor Architecture, Programming and Applications with 8085, *5th Edition*, PIP Publication.
2. Microprocessors and Microcontrollers, S K Mandal. WBUT Series by TMH.
3. Microprocessor Systems, A. P. Godse & D. A. Godse. Technical Publications Pune, 2nd Revised Edition.
4. Fundamentals of Microprocessors and Microcontrollers, B. Ram, Dhanpat Rai Publications.