

MICROPROCESSORS AND MICROCONTROLLERS

Course Code	19EC3601	Year	III	Semester	II
Course Category	Program Core	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Computer Architecture and Organization
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes		BT Level
Upon successful completion of the course, the student will be able to		
CO1	Compare programmer's model of 8086 microprocessor and ARM processor.	L2
CO2	Apply knowledge and demonstrate programming proficiency using the various addressing modes and instructions of the target microprocessor and microcontroller.	L3
CO3	Develop programs to interface various peripherals with microcontroller.	L3
CO4	Design and develop real time application modules using ARM microcontroller	L6

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)

Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation

* - Average value indicates course correlation strength with mapped PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2									2	2
CO2	3	3	2	2									2	2
CO3	3	3	2	2									2	2
CO4	3	3	2	2									2	2
CO5	3	3	2	2									2	2
Average* (Rounded to nearest integer)	3	3	2	2									2	2

Syllabus		
Unit No.	Contents	Mapped CO
I	8086 Architecture: Main features, 8086 microprocessor internal architecture, bus interfacing unit, execution unit, pin diagram/description, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.	CO1
II	8086 Programming: Program development steps, instructions, addressing modes, assembler directives, writing programs with an assembler, assembly language program development tools.	CO2

III	<p>Cortex-M: Architecture: Introduction to Cortex-M Microcontroller, Microprocessor Architecture, Nested Interrupt Vector Controller, Bus system and Bus matrix, Memory and Peripherals, Debug System.</p> <p>Exceptions and Interrupts Architecture: The Cortex-M Exception and Interrupts, Exceptions and Interrupt Priority, Interrupt Configuration, Handling of Exceptions or Interrupts.</p>	CO1
IV	<p>Programming: Basics of Assembly Programming, Data Processing Instructions, Memory Access Instructions, Branch and Control Instructions.</p>	CO2
V	<p>Interfacing: Fundamentals of Input-Output Interfacing: Basic Microcontroller GPIO Interfacing, Cortex-M-Based TM4C L23 Microcontroller Peripherals, Configuring Microcontroller Pins as GPIOs, Input-Output interfacing for LED and Switch, Seven-Segment LED Interfacing, Keypad Interfacing, Interfacing an LCD module.</p> <p>Timing Interfaces: Basics of Timing Interfaces, Clocking a Microcontroller, TM4C123 Clock and Frequency Configuration, Timer Basics, TM4C123 Timing Interfaces and SysTick Timer, Timer as Input Device, Timer as Output Device, General Purpose Timer modules in TMC123.</p>	CO3, CO4

Learning Resources

Text Books

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rd Edition.
2. ARM Microprocessor Systems – Cortex – M Architecture, Programming, and Interfacing by Muhammad Tahir and Kashif Javed, CRC Press.
3. The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors by Joseph You

Reference Books

1. Embedded Systems Fundamentals with ARM Cortex-M based Microcontrollers: A Practical Approach in English, by Dr. Alexander G. Dean, Published by Arm Education Media
2. Cortex -M3 Technical Reference Manual