

MICROPROCESSORS AND MICROCONTROLLERS

V Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
AECC19	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			

Prerequisites: Digital System Design

I. COURSE OVERVIEW:

Processor and controller cores are the key components in most of the modern embedded and system on-chip designs. This course outlines the architecture and signal description of Intel microprocessor and microcontrollers. The instruction set and assembly language programming along with I/O and memory interfacing techniques are covered. The knowledge acquired from this course will enable the students in development of embedded hardware projects and models for engineering and scientific applications.

II. COURSE OBJECTIVES:

The Students will try to learn:

- I. The signal descriptions along with functional architecture and hardware interfacing skills using microprocessors and microcontrollers.
- II. The instruction set and logic to build assembly language programs for arithmetic, logic and automated electronic systems.
- III. The essential concepts of development through a practical hands-on approach on advanced ARM processors and Internet of Things based systems.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

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|------|--|------------|
| CO 1 | Describe the features of intel processors and micro controllers for signal description and architecture. | Understand |
| CO 2 | Make use of addressing modes and instruction set of target microprocessors and micro controllers for writing efficient assembly language programs. | Apply |
| CO 3 | Demonstrate the internal architecture and modes of operation of peripheral devices for interfacing memory and I/O devices. | Understand |
| CO 4 | Illustrate the interrupt handling mechanism in microprocessors and micro controllers using interrupt controller. | Understand |
| CO 5 | Choose an appropriate data transfer scheme and hardware for data transfer between the devices. | Apply |
| CO 6 | Develop microprocessor and micro controller based applications using appropriate input and output devices. | Apply |

IV. COURSE SYLLABUS:

MODULE –I: 8086 MICROPROCESSOR (10)

8086 Architecture, Register Organization, Memory Segmentation, Signal descriptions of 8086, modes of operation with timing diagrams, interrupts Addressing modes and Instruction Set of 8086. Simple Programs involving arithmetical, Logical, Branch and Call Instructions, Sorting, String Manipulations.

MODULE –II: INTERFACING DEVICES (09)

PIO 8255 modes of operation of 8255, stepper motor interfacing, interfacing to D/A and A/D converters, Semiconductor memory interfacing, dynamic RAM interfacing, USART.

MODULE –III: 8051 MICROCONTROLLER (09)

8051 Microcontroller – Internal architecture and pin configuration, 8051 addressing modes, instruction set, Bit addressable features.
I/O Port structures, assembly language programming using data transfer, arithmetic, logical and branch instructions.

MODULE –IV: SYSTEM DESIGN USING MICROCONTROLLER (08)

8051 Timers/Counters, Serial data communication and its programming, 8051 interrupts, Interrupt programming. Real world interfacing of 8051 with external memory, expansion of I/O ports, stepper motor, ADC, DAC, LCD.

MODULE –V: ARM ARCHITECTURE (09)

ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

V. TEXT BOOKS:

1. A.K Ray, K. M. Bhurchandani, “Advanced Microprocessors and Peripherals” Tata McGraw-Hill Education, 2nd Edition, 2006.
2. Kenneth. J. Ayala, “The 8051 Microcontroller”, Cengage Learning, 3rd Edition, 2004.
3. Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, “ARM System Developers guide”, Elsevier, 1st Edition, 2012.

VI. REFERENCE BOOKS:

1. N. Senthil Kumar, M. Saravanan, S. Jeevanathan, S. K. Shah, “Microprocessors and Interfacing”, Oxford University, 1st Edition, 2012.
2. Lyla B. Das, “The x86 Microprocessors”, Pearson India, 2nd Edition, 2014.
3. D. V. Hall, “Microprocessors and Interfacing”, Tata McGraw-Hill Education, 3rd Edition 2013.

VII. WEB REFERENCES:

1. <http://www.daenotes.com/electronics/digital-electronics/Intel-80858bitmicroprocessor#axzz2I9yUSe7I>
2. <https://www.smartzworld.com/notes/microprocessors-and-microcontrollers-mpmc/>
3. <http://www.iare.ac.in>

VIII. E-TEXT BOOKS:

1. <http://engineersevanigam.blogspot.in/2013/07/microprocessors-and-interfacing-by.html>
2. <https://www.scribd.com/doc/153593067/Microprocessor-by-A-P-Godse-D-A-Godse>