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| **EC3503** | **Microprocessor & Microcontroller** | **L-T-P: 3-0-0; Total 42 Lectures** |

***Prerequisite:*** Digital Electronics and Computer organization

***Objectives:***

1. To understand characteristics and architectures of various microprocessors and microcontrollers.
2. Understand basic programming concepts and software tools
3. Learn various interfacing circuits necessary for various applications
4. To learn various interfacing concepts.

***Course Contents:***

**UNIT I:** Introduction to 8086 Microprocessor, Architecture of 8086 Microprocessor, Addressing modes of 8086, Instruction set of 8086, Assembler directives, simple assembly language programs, procedures, and macros. Pin diagram of 8086-Minimum mode and maximum mode of operation**.** (10L)

**UNIT II:** Memory and I/O organization of 8086, 8255 PPI – various modes of operation and interfacing to 8086, D/A and A/D converter to 8086 using 8255, memory interfacing to 8086. (10L)

**UNIT III:** Serial Communication standards, serial data transfer schemes, 8251 USART architecture and interfacing, RS-232, IEEE 488 standards. Interrupt structure of 8086, Interrupt Vector Table. Need for 8259 Programmable Interrupt Controller.(6L)

**UNIT IV:** Introduction to Microcontrollers, 8051 Microcontroller Architecture, I/O ports, memory organization, counters and Timers, Serial data Input/Output, Interrupts. Addressing modes, Instruction set of 8051, Simple programs.Timer, serial port and Interrupts programming: Programming 8051 timers/counters, 8051 serial port programming, programming timer interrupts, programming External hardware interrupts, programming serial communication interrupts. (7L)

**UNIT V:** Interfacing to 8051: A/D and D/A Converter, Stepper Motor Interface, Key Board Interfacing, LCD Interfacing.

ARM Processor: Fundamentals, Registers, current program status register, pipeline, Exceptions, Interrupt and the vector table.(9L)

***Text Books:***

1. Microprocessors and interfacing – Douglas V. Hall, TMH, 2nd Edition, 1999.
2. The 8051 microcontrollers and Embedded systems- Mazidi and Mazidi, PHI, 2000.
3. ARM System Developer’s Guide: Designing and Optimizing System Software- Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Inc., 2007

***References:***

1. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd edition.
2. Advanced microprocessors and Peripherals – A.K.Ray and K.M.Bhurchandi, TMH, 2000.
3. Micro Computer System 8086/8088 Family Architecture Programming and Design – By Liu and GA Gibson PHI, 2nd Edition
4. Microcontrollers and Applications, Ajay . V. Deshmukh, TMGH,2005.
5. The 8085 Microprocessor : Architecture Programming and Interfacing – K.Uday Kumar, B.S Umashankar, Pearson , 2008.

***Course Outcomes :***

1. Demonstrate the ability to design a system, component or a process as per needs and specifications (C0-1)
2. Select the proper architecture for the implementation of digital designs (C0-2)
3. Write various assembly language programs for a given task using 8086, 8051 and ARM processors. (C0-3)
4. Design and implement microprocessor and microcontroller based systems. (C0-4)