Course Code	Name of Course	Course Structure		Pre-requisites
CEECC08/ CAECC08	**Microprocessors and Microcontrollers**	**L-T-P**	**3-0-2**	**None**

COURSE OUTCOMES

CO1: Acquire knowledge of architecture and programming of microprocessors.
CO2: Understand the salient features of the x86 architecture.
CO3: Acquire hands-on knowledge of interfacing microprocessors with peripherals.
CO4: Understand the architecture and working of microcontrollers and their utility.
CO5: Acquire introductory knowledge about high-end microprocessors and microcontrollers.

COURSE CONTENT

Unit 1 -Basic concepts of microprocessor, microcomputer, microcontroller. CISC and RISC architectures. Intel 8086 Architecture (pins, bus interface unit, execution unit, register set, pipelining), memory addressing, segmentation,

Unit 2 - Intel 8086 instruction set (data transfer, arithmetic, logic, string, long and short control transfer and processor control), timing diagrams, operating modes, programming, assemblers, address-objects, parameter passing to subroutines, hardware and software interrupts and interrupt handling of 8086.

Unit 3 - Interfacing of microprocessors: Interfacing a microprocessor with RAM and ROM chips, address allocation and decoding techniques. Interfacing with LED, LCD, ADC, DAC, toggle switch and keypad. Memory-mapped i/o. Interfacing

with 8255 (architecture, ports, i/o modes and BSR mode) , 8251. Basic architecture and features and interfacing of 8251, 8259 programmable interrupt controller,

Unit 4 - Microcontrollers: 8051 microcontroller: architecture, i/o ports, memory organization, addressing modes, instruction set, simple programs. Introduction to IoT: basic architecture, sensing and actuating, application domains.

Unit 5 - High-end microprocessors and microcontrollers: Important features of 32-bit processors, Introduction to Arduino: basic architecture, hardware and software, simple programs. Cortex -M Architecture

SUGGESTED READINGS

1. D. V. Hall, "Microprocessor and Interfacing Programming & Hardware" TMH – 2nd Edition.
2. S. P. Morse, "8086 Primer: An Introduction to Its Architecture, System Design and Programming" Hayden Book Co.
3. S. Monk, "Programming Arduino: Getting Started with Sketches", 2nd Edition, McGraw-Hill.
4. M.A. Mazidi et. al. "The 8051 Microcontroller and Embedded Systems: Using Assembly and C" Pearson Publishers.
5. Jonathan W. Valvano "Introduction to ARM Cortex M Microcontroller"-5th Edition.

Guidelines for practical work:

1. Write an assembly program to generate the numbers of the Fibonacci series.
2. Write an assembly program to clear all flags without using any data transfer instruction.
3. Write an assembly program to search for a number in a list.
4. Write an assembly program to sort a list.
5. Write an assembly program to copy a list from one part of the memory to another.
6. Write an assembly program to multiply two numbers using successive additions.
7. Write an assembly program to calculate the square root of a number.
8. Write an assembly program to calculate the factorial of a number using recursion.
9. Write a self-replicating assembly program.
10. Interface 8255 with a microprocessor and use all its modes.
11. Interface 8251 with a microprocessor and use it to generate differ types of clock signals.
12. Interface 8259 with a microprocessor and use all its features.
13. Design digital systems with Arduino and simple sensors and actuators.

Note: Course teachers may design 3-4 new experiments/small projects in addition to the above suggested practical exercises.