Microprocessors and Microcontrollers

Course Code	23EC3602	**Year**	III	**Semester**	II
Course Category	PC	**Branch**	ECE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Computer Organization and Architecture
Continuous Internal Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		BL
CO1	**Compare** programmer's model of 8086 microprocessor, 8051 microcontroller 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	**Analyse** various peripherals to interface with microcontroller.	L4
CO4	**Design** and develop application modules using ARM microcontroller	L5

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix) Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2										1		
CO2	3										1	1	2
CO3	3	3									1	1	2
CO4	3	3	3								1	1	2
Avg.,	3	3	3								1	1	2

Syllabus		
Unit No.	**Contents**	**Mapped CO**
1	**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. **8086 Programming:** Program development steps, instructions, addressing modes, assembler directives, writing programs with an assembler, assembly language program development tools.	CO1, CO2
2	**Cortex-M: Architecture:** Introduction to Cortex-M Microcontroller, Microprocessor Architecture, Nested Interrupt Vector Controller, Bus system and Bus matrix, Memory and Peripherals, Debug System. **Exceptions and Interrupts Architecture**: The Cortex-M Exception	CO1, CO2

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	and Interrupts, Exceptions and Interrupt Priority, Interrupt Configuration, Handling of Exceptions or Interrupts.	
3	**Programming:** Basics of Assembly Programming, Data Processing Instructions, Memory Access Instructions, Branch and Control Instructions.	CO1, CO2
4	**Interfacing:** Fundamentals of Input-Output Interfacing: Basic Microcontroller GPIO Interfacing, Cortex-M-Based Microcontroller Peripherals, Configuring Microcontroller Pins as GPIOs, Input-Output interfacing for LED and Switch, Seven Segment LED Interfacing, Keypad Interfacing, Interfacing an LCD module, ADC, UART.	CO1-CO4
5	**Timing Interfaces:** Basics of Timing Interfaces, Clocking a Microcontroller, Clock and Frequency Configuration, Timer Basics, Timing Interfaces and Systick Timer, Timer as Input Device, Timer as Output Device.	CO1-CO4

Learning Resources

Text Books

1. K. M. Bhurchandi, A. K. Ray, Advanced microprocessors and peripherals, 3rd Ed., Tata Mcgraw Hill Education Private Limited, 2012.
2. Muhammad Tahir and Kashif Javed, ARM Microprocessor Systems – Cortex – M Architecture, Programming, and Interfacing, 1st Ed., CRC Press, 2017.
3. Joseph Yiu, The Definitive Guide to ARM Cortex-M3 and Cortex-M4 Processors, 3rd Ed., Newnes, 2014.

Reference Books

1. Douglas V Hall, SSSP Rao, Microprocessors and Interfacing – Programming and Hardware, 3rd Ed.,Tata McGraw Hill Education Private Limited,
2. Dr. Alexander G. Dean, Embedded Systems Fundamentals with ARM Cortex-M based Microcontrollers: A Practical Approach in English, Published Arm Education Media
3. Cortex -M3 Technical Reference Manual

e-Resources

1. www.Arm.com
2. www.ocfreaks.com

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