

# PEI308: MICROCONTROLLER BASED SYSTEM DESIGN

L T P Cr  
2 1 2 3.5

**Course Objectives:** To understand the concepts of microcontroller based system, to enable design and programming of microcontroller based system

**Review of 8-bit microcontrollers:** Introduction to 16-bit microcontrollers, Introduction to 32-bit ARM microcontrollers Architecture, Functional blocks, Programmer's model, Timer, Counter, Interrupts, ISR, GPIO. A/D configuration and interfacing.

**Assembly and C-programming:** ARM microcontrollers, Programming for Timer, Delays, Port interfacing, LED, A/D, LCD and Keypad programming. Introduction to Rs232, Rs485, CAN, Ethernet, Wireless 802.11 standards/protocols. MODBUS

**Data communication and interfacing:** communication using I2C, SPI, RS232, RS485, CAN, and CAN, USB , Bluetooth, protocols. Interfacing with Optocoupler/Relay, RTC, EEPROM, GPS, GPRS, Ethernet interface design principles.

**Introduction to RTOS:** A case study based on 32-bit ARM Cortex microcontrollers for Web monitoring of a system using transducers and display running free RTOS.

**Laboratory Work:** basic programming of ARM microcontroller, Programming of Timer/counters, Port interfacing, LED, A/D, LCD and Keypad. Interfacing with I2C, SPI, RS232, RS485, CAN, RTC, EEPROM, GPS, Ethernet and CANBUS.

## Course learning outcome (CLO):

1. Review 8-bit microcontrollers
2. Implement assembly and c-program of ARM microcontrollers.
3. Design of basic circuits for ARM microcontroller.
4. Design interfacing circuits for ARM microcontroller.

## Recommended Books:

1. *Elahi, A., Arjeski, T., ARM Assembly Language with Hardware Experiments, Springer, (2014)*
2. *Hintenaus, P. ,Engineering Embedded Systems, Springer, (2015)*

## Evaluation Scheme:

Evaluation Elements	Weightage (%)
MST	20
EST	40
Sessionals (May include Assignments/ Projects/ Tutorials/ Quizes/ Lab Evaluations)	40