Microcontroller and Applications(304203)

Teaching Scheme:
Lectures: 3 Hrs/Week

Examination Scheme:
In Semester Assessment:
Phase I : 30

End Semester Examination:
Phase II: 70

Course Objectives:
- To understand the applications of Microprocessors & Microcontrollers.
- To understand need of microcontrollers in embedded system.
- To understand architecture and features of typical Microcontroller.
- To learn interfacing of real world input and output devices
- To study various hardware and software tools for developing applications

Course Outcomes:
After successfully completing the course students will be able to
- Learn importance of microcontroller in designing embedded application
- Learn use of hardware and software tools
- Develop interfacing to real world devices

Unit I : Introduction to Microcontrollers   6L
8 bit Microprocessor & Microcontroller architecture, comparison, advantages & applications of each. Harward & Von Neumann architecture, RISC & CISC comparison. Survey of 8 bit controllers and its features Definition of embedded system & its characteristics. Role of microcontroller in embedded System. Limitation of 8 bit microcontrollers. Study of RS232,RS 485,I2C,SPI protocols. Software & hardware tools for development of microcontroller based system such as assembler, compiler, IDÉ, Emulators, debugger, programmer, development board, DSO, Logic Analyzer,

Unit II : 8051 Architecture   6L
MCS-51 architecture, family devices & its derivatives. Port architecture, memory organization, Interrupt structure, timers and its modes & serial communication and modes. Overview of Instruction set.

Unit III : PIC Microcontroller Architecture   6L
PIC 10, PIC12, PIC16, PIC18 series architectures, comparison, features and selection as per application. PIC18f architecture, registers, memory Organization and types, stack, oscillator options, BOD, power down modes and configuration bit settings. Brief summary of Peripheral support, Overview of instruction set, MPLAB IDE & C18 Compiler.

Unit IV : Real World Interfacing Part I   6L

Port structure, interrupt structure & timers of PIC18F. Interfacing of switches. LED, LCD, Keypad, use of timers, With interrupts, PWM generation. All programs in embedded C.

Unit V : Real World Interfacing Part II   6L

MSSP structure, UART, SPI, I2C, ADC, Comparators, Interfacing serial port, ADC, RTC with I2C and EEPROM with SPI. All programs in embedded C.

Unit VI : Case studies with PIC   6L

Design of DAS system, Design of frequency counter with display on LCD, Design of Digital Multimeter, 4 Design of DC Motor control using PWM Should cover necessary signal conditioning of input stage ,hardware interfacing with PIC   Microcontroller and algorithm or flowchart.

Text Books
1. Mazidi, 8051 microcontroller & embedded system 3rd Edition ,Pearson
2. Mazidi, PIC microcontroller & embedded system 3rd Edition ,Pearson

Reference Books
1. 18F xxx reference manual www.microchip.com
2. I2C,EEPROM,RTC data sheets from   www.ti.com