SEMESTER	***DEPARTMENT***	***COURSE TITLE***
Eighth	*Power Engineering*	*Microcontrollers*
COURSE CODE	***HOURS:*** 3	***COURSE SPECIFICATIONS***
EC807	***UNITS:*** 3	*Theoretical Content*

1. ***Computer Systems:***
   - PC systems.
   - Microprocessor systems.
   - Microcontroller systems.
   - Basic Architecture of MCU.
   - Von Neumann and Harvard architectures
   - CISC and RISC architectures

2. ***Information Coding:***
   - Overview in number systems.
   - Levels of programming languages.
   - Structure of assembly language.

3. ***PIC Microcontroller:***
   - PIC microcontroller families.
   - The arithmetic and logic unit (ALU) and the Working register in PIC MCU.
   - Machine cycles and execution of instructions.
   - Pipelining for instruction execution.
   - Oscillators.
   - Watchdog.

4. ***Memory in PIC MCU:***
   - Logic organization of memory.
   - Types of memory.
   - Memory in Medium- End PIC MCU:
     - Program memory.
     - RAM data memory

5. *Instruction Set in Medium-End PIC Microcontrollers (from PIC16F628 datasheet):*

- Data transfer instructions .
- Arithmetic and logic instructions.
- Control transfer instructions: including subroutine ,calls and returns.
- Bit manipulation instructions.
- Arithmetic operators.

6. *Parallel Input/ Output in PIC MCU:*

- Basic concepts : peripheral , port..etc.
- Data transfer techniques
- Input/Output Techniques .
- Parallel Ports in Medium-End PIC Microcontrollers : (Port A – G and parallel slave port).
- Connection of commonly used peripherals : (Switches, LEDs, 7 segment display..etc).

7. *Timers and Counters:*

- Timers and counters in PIC MCU.
- Types of counters.
- Timer modules:
  - Timer0 module.
  - Timer1 module.
  - Timer2 module.
- The CCP module: capture mode; compare mode; and PWM mode.

8. *Interrupts:*

- General structure of an interrupt service subroutine.
- Interrupt sources and associated registers in PIC MCU.
- Interrupt service subroutine structure in PIC MCU.
- An example of interrupt Applications: real time clock.

9. ***Serial Input and Output:***

- Introduction to serial data transmission.
- Asynchronous communication.
- Synchronous communication.

References:

1. Fernando E. Valdes-Perez, Ramon Pallas-Areny, ***Microcontrollers ,Fundamentals and Applications with PIC***, CSC Press.
2. PIC16F628 datasheet.
3. www.microchip.com
4. MPLAB IDE (free versions can be downloaded from Microchip)