

## **EMBEDDED SYSTEMS**

**EE-604 D**

**Credit: 3**

**Contact: 3L**

### **Module 1 [10]**

#### **Introduction to Embedded systems:**

Introduction – Features – Microprocessors – ALU - Von Neumann and Harvard Architecture

CISC and RISC - Instruction pipelining.

Microcontroller: characteristics and Features, Overview and architectures of Atmel 89C52 and Microchip PIC16F877 and 18F452.

Examples of embedded Systems: Bar-code scanner, Laser printer, Underground tank monitoring.

### **Module 2 [08]**

#### **PIC Microcontroller:**

PIC Microcontrollers: 16F877 Architecture and Instruction Set. External Interrupts, Timers, watch-dog timer, I/O port Expansion, analog-to-digital converter, UART, I2C and SPI Bus for Peripheral Chips, Accessories and special features

### **Module 3 [08]**

#### **Software architecture and RTOS:**

Software Architecture: Round Robin- Round Robin with interrupts -Function Queue. Scheduling

Architecture RTOS: Architecture -Tasks and Task States -Tasks and Data -Semaphores and Shared Data

Message Queues -Mail Boxes and pipes -Timer Functions -Events -Memory Management

Interrupt

Routines

### **Module 4 [06]**

#### **Basic design using a real time operating system:**

Overview. General principles. Design of an embedded system.

### **Module 5 [08]**

#### **Software development tools and debugging techniques:**

Development Tool: Cross-Compiler, Cross-Assemblers, Linker/locator. PROM Programmers, ROM

Emulator, In-Circuit Emulators. Debugging Techniques. Instruction set simulators. The assert macro.

Testing using laboratory tools.

#### **Text Books:**

1. Embedded Systems Architecture, Programming and Design, Ral KamalTMH, 2008.
2. An Embedded Software Primer, D.E. Simon. Pearson Education, 1999.
3. Design with PIC Microcontrollers, J.B. Peatman,Pearson Education, 1998

#### **Reference Books:**

1. Embedded Systems Design, Heath Steve, Second Edition-2003, Newnes,
2. Computers as Components; Principles of Embedded Computing System Design, Wayne Wolf Harcourt India, Morgan Kaufman Publishers, First Indian Reprint. 2001.
3. Embedded Systems Design – A unified Hardware /Software Introduction, Frank Vahid and Tony Givargis, John Wiley, 2002.