Prasad V. Potluri Siddhartha Institute of Technology, Kanuru, Vijayawada.

Department of ECM   **PVP12**

<p align="center">4/4 B.Tech. SEVENTH SEMESTER</p>

EM7T2   **Credits: 4**

<p align="center">EMBEDDED SYSTEMS</p>

Lecture: 4 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 marks**

Cousre Objectives:

- The objective of this course is to equip the students with the basic concepts of Embedded System, applications in which they are used, various aspects of embedded system design from Hardware and Software points.
- It tells what makes a system a real-time system and describes the characteristics of latency in real-time systems.

Learning Outcomes:

Students will be able to
- Differentiate between microprocessor and microcontroller
- Understand the basics of an Embedded system(ES)
- Develop 8051 microcontroller programming
- State difference between general purpose computer system and ES
- State application of ES in various fields.
- Draw hardware and software architecture of ES
- Understand the concepts of RTOS
- Design and implement simple embedded systems in real time

Unit - I
A First look at embedded Systems-Introduction of Embedded Systems, Examples of Embedded systems,Typical Hardware for embedded systems

Unit - II
Hardware Fundamentals for Software Engineer: Basic Terminology, Gates, A few other Basic Considerations, Timing Diagrams, Memory

Unit - III
Advanced Hardware Fundamentals: Microprocessors, Buses, Direct Memory Access, Interrupts, other Common parts, built-Ins on the microprocessor, Conventions used on Schematics.

Unit - IV
Interrupts: Microprocessor Architecture, Interrupt Basics, The shared data problem, Interrupt latency
Survay of Software architecture: Round-Robbin, Round-Robin with interrupts, Function-queue- scheduling Architecture, Real Time Operating System Architecture,Selecting an Architecture

Unit - V
Introduction to Real – Time Operating Systems : Tasks and Task States, Tasks and Data, Semaphores, and Shared Data

Unit-VI
More Operating system services: Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

Unit - VII
Basic Design Using a Real-Time Operating System : Principles,Encapsulating Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like μC-OS (Open Source);

Unit - VIII
Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System.

Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

TEXT BOOK :
1. An Embedded Software Primer, David E. Simon, Pearson Education.

REFERENCES :
1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.