

**Objectives**

To introduce the embedded system and its applications. Also to introduce the core of embedded system, working and basics of operating systems used in embedded systems.

**UNIT -I:**

**Introduction to Embedded Systems**

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

**UNIT -II:**

**Typical Embedded System:**

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

**UNIT -III:**

**Embedded Firmware:**

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

**UNIT -IV:**

**RTOS Based Embedded System Design:**

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

**UNIT -V:**

**Task Communication:** Shared Memory, Message Passing, Remote Procedure Call and Sockets, **Task Synchronization:** Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

**Expected outcome**

The student will be able to understand the fundamentals of embedded systems. Student can also appreciate various components, functions and operating systems of embedded systems

**TEXT BOOKS:**

1. Embedded Systems- Architecture, programming and design 2<sup>nd</sup> edn. - Raj Kamal, Tata Mc-Grow Hill, New Delhi, (2008).
2. Introduction to Embedded Systems, 1<sup>st</sup> edn. Shibu K.V, Tata Mc-Grow Hill, New Delhi, (2009)