GUJARAT TECHNOLOGICAL UNIVERSITY
M.E. - Electronics & Communication Engineering
(VLSI &Embedded Systems Design)
Semester: I

Subject Name**: Embedded Systems Software Design**
Subject Code**: 715203**

Objective:

The study of embedded systems software, programming and relevant applications. In the process of the laboratory work it is necessary to use and study standard and emerging development kit platforms for application development. The focus of the course is not on lecture, but a study of a real system and application development using its resources.

Lectures:

UNIT I :

Introduction to Embedded Systems, Growth of Embedded Systems, Embedded System Architecture and components including sensors, ADC, DAC, control and status units, communication interfaces, Types of embedded systems, Design constraints, Concept of compilers and debuggers, Need for prototyping, Prototyping using FPGA platforms.

UNIT II :

Introduction to Embedded C, Need for Embedded C, Difference between C and Embedded C, Embedded C fundamentals – data types, functions, pointers, structures.

UNIT III :

Introduction to Keil C and Keil compiler, Simulating embedded applications, configuration settings, build, compile, link, debug, run commands, Interfacing input and output devices.

UNIT IV:

Microcontroller architecture and assembly language programming, Instruction set, types of instructions, branch, call, interrupt service routine, Programming using different types of MCUs.

UNIT V:

Applications of embedded systems – communication systems, automotives, home appliances, security systems, aviation.

Lab:

Tools used during laboratory works: Keil, Cypress PSoC, relevant FPGA or MCU kits.

- Study and implementation of compilers and debuggers.
- Study and implementation of applications on various platforms.

Course Project:

A project of suitable complexity, comprising of program design, coding, compilation and debug must be completed.

Course Material:

The field of VLSI and Embedded Systems is getting updated constantly and to keep up to date with the latest research, technology and industry trends, Instructor for this course will decide and provide the course material. This could be a combination of slides or research material or text book references or any other relevant documentation depending on a) the nature of the curriculum and b) relevant skills to be imparted as outcome of the course.

Reference Books:

1. Product documentation from ARM (KEIL), Cypress, other FPGA/MCU vendors.
2. William Hohl. ARM Assembly Language - Fundamentals and Techniques, CRC Press, Taylor and Francis Group 2009
3. Michael Barr and Anthony Massa. Programming Embedded Systems with C and GNU development Tools, O'Reilly 2007
4. Instructors may recommend additional textbooks or reference material – the subject content is rapidly changing and an up to date text book at the time of the class may be recommended.