EC531 - SOFTWARE FOR EMBEDDED SYSTEMS

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Course Learning Outcomes:
- To be able to understand the usage and advantages of Low level and High level languages
- To be able to understand the fundamentals of embedded Programming.
- To be able to understand GNU C Programming Tool Chain in Linux.
- To be able to understand basic concepts of embedded C and Embedded OS
- To be able to understand concepts of embedded Java .

UNIT - I   **(9 hours)**

Embedded Programming

C and Assembly - Programming Style - Declarations and Expressions - Arrays, Qualifiers and Reading Numbers - Decision and Control Statements - Programming Process - More Control Statements - Variable Scope and Functions - Advanced Types – Simple Pointers - In-line Assembly.

UNIT - II   **(9 hours)**

C Programming Toolchain in Linux

C Preprocessor - Stages of Compilation - Debugging and Optimization- Introduction to GCC - Debugging with GDB - The Make utility - Building and Using Libraries -Profiling using *gprof-Memory Leak Detection with valgrind.*

UNIT - III   **(9 hours)**

Embedded C and Embedded OS

Adding Structure to 'C' Code: Object oriented programming with C, Header files for Project and Port, Examples. Meeting Real-time constraints: Creating hardware delays - Need for timeout mechanism - Creating loop timeouts -

Creating hardware timeouts. Creating embedded operating system: Basis of a simple embedded OS, Introduction to sEOS, Using Timer 0 and Timer 1, Portability issue, Alternative system architecture, Important design considerations when using sEOS.

UNIT - IV   **(9 hours)**

Time-Driven Multi-State Architecture and Hardware

Multi-State systems and function sequences: Implementing multi-state (Timed) system - Implementing a Multi-state (Input/Timed) system. Using the Serial Interface: RS232 - The Basic RS-232 Protocol - Asynchronous data transmission and baud rates - Flow control – Software architecture - Using on-chip UART for RS-232 communication - Memory requirements – The serial menu architecture - Examples. Case study: Intruder alarm system.

UNIT - V   **(9 hours)**

Embedded Java

Introduction to object oriented concepts : Core Java/Java core-Java buzzwords, overview of java programming, Data types, variables and arrays, operators, Control statements. Understanding J2ME connected Device configuration, Connected Limited device configuration, Profiles, Anatomy of MIDP applications, Advantages of MIDP.

TEXT BOOKS:

1. Michael J Pont, "Embedded C", Pearson Education, 2007.
2. Steve Oualline, 'Practical C Programming 3rd Edition', O'Reilly Media, Inc, 2006.
3. Stephen Kochan, "Programming in C", 3rd Edition, Sams Publishing, 2009.

REFERENCES:

1. Beginning J2ME-From Novice to Professional-3rd Edition , Sing Li and Jonathan Knudsen,Dreamtech Press, NewDelhi.
2. GNU/Linux application programming, Jones, M Tim, Dreamtech press, New Delhi
3. C and the 8051 Programming Volume II, Building efficient applications, Thomas W Schultz, Pretice hal
4. UNIX NETWORK PROGRAMMING, STEVENS, W RICHARD , PH, New Jersey
5. Linux Device Drivers, 2nd Edition, By Alessandro Rubini & Jonathan Corbet, O'Reilly
6. Data Structures Using C- ISRD group, TMH

8. Data structures –Seymour Lipschutz, Schaums Outlines

9. C Programming for Embedded systems, Zurell, Kirk

10. C and the 8051 Programming for Multitasking – Schultz, Thomas W

11. C with assembly language, Steven Holzner, BPB publication

12. C and the 8051: Hardware, Modular Programming and Multitasking Vol i – Schultz, Thomas W

13. Art of C Programming, JONES, ROBIN,STEWART, IAN

14. Kelley A & Pohl, " A Book on C", Addison – Wesley

15. Advanced Linux Programming Mark Mitchell, Jeffrey Oldham, and Alex Samuel, TECHMEDIA

EC539 - VLSI TECHNOLOGY AND DESIGN (Elective I)

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4	-	-	4	4

Course Objectives:

·   To learn the basic MOS Circuits

·   To learn the MOS Process Technology

·   To understand the operation of MOS devices.

·   To impart in-depth knowledge about analog and digital CMOS circuits

Course Learning Outcomes:

·   Understand the fabrication process of IC technology

·   Analysis of the operation of MOS transistor

·   Analysis of the physical design process of VLSI design flow

·   Analysis of the design rules and layout diagram

·   Design of Adders, Multipliers and memories etc

·   Making sense of the ASICs

·   Getting the idea of design approach

UNIT - I   **(8 hours)**

VLSI Fabrication Technology

An overview of wafer fabrication, oxidation, Photo Lithography, Diffusion, Ion implantation, Metallization, Packaging,nMOS process, n well CMOS process, p well CMOS process, Twin-Tub process, Silicon on insulator process, Bi-CMOS process.

UNIT - II   **(9 hours)**

Introduction to MOS Technology and Electrical Properties

Overview of VLSI Design Methodology VLSI design process- Basic MOS transistors- Enhancement mode transistor operation - Drain current Vs voltage derivation -NMOS inverter- Determination of pull up to pull down ratio for an NMOS inverter-CMOS inverter - DC Characteristics- Bi-CMOS inverter-Latch up in CMOS circuits.