

**VELTECH MULTI TECH Dr. RANGARAJAN Dr. SAKUNTHALA ENGINEERING
COLLEGE**

Accredited by NBA, New Delhi

An ISO 9001:2008 Certified Institution

(Owned by Vel Trust 1997)

Approved by AICTE, New Delhi NBA Accredited & Affiliated to Anna University Chennai-25



**SYLLABUS
WEEKLY SCHEDULE**

SEMESTER II

2014- 2015

DEPARTMENT OF EEE

COURSE- M.E-EMBBEDED SYSTEM TECHNOLOGIES

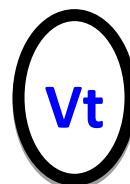
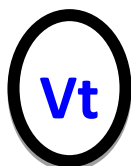
2 YEAR COURSE

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VELTECH MULTITECH Dr.RANGARAJAN Dr.SAKUNTHALA ENGG. COLLEGE

DEPARTMENT OF EEE

WEEKLY SCHEDULE

SEM : II YEAR : I

ACADEMIC YEAR: 2014– 2015

S.No	WEEKS	DATE	
		FROM	TO
1	WEEK1	07.01.15	09.01.15
2	WEEK2	12.01.15	16.01.15
3	WEEK3	19.01.15	23.01.15
4	WEEK4	27.01.15	30.01.15
5	WEEK5	02.02.15	06.02.15
6	WEEK6	09.02.15	13.02.15
7	WEEK7	16.02.15	20.02.15
8	WEEK8	23.02.15	27.02.15
9	WEEK9	02.03.15	06.03.15
10	WEEK10	09.03.15	13.03.15
11	WEEK11	16.03.15	20.03.15
12	WEEK12	23.03.15	27.03.15
13	WEEK13	30.03.15	01.04.15
14	WEEK14	06.04.15	10.04.15
15	WEEK15	13.04.15	17.04.15
16	WEEK16	20.04.15	24.04.15
17	WEEK17	27.04.15	30.04.15

CONTENTS
THEORY

S.NO	SUB. CODE	SUBJECT
1.	ET7201	VLSI Architecture and Design Methodologies
2.	ET7202	Embedded networking
3.	ET7203	Wireless and Mobile Communication
4.	ET7204	Software for Embedded Systems
5.	ET7005	ADHOC Networks
6.	ET7007	RISC Processor Architecture and Programming

PRACTICAL

S.NO	SUB. CODE	SUBJECT
1.	ET7211	Embedded System Laboratory II

TEST SCHEDULE

SL.NO	SUBJECT CODE	SUBJECT NAME	UNIT TEST I	UNIT TEST II	UNIT TEST III	UNIT TEST IV
1	ET7201	VLSI Architecture and Design Methodologies	27.01.15 FN	16.02.15 FN	06.03.15 FN	26.03.15 FN
2	ET7202	Embedded networking	27.01.15 AN	16.02.15 AN	06.03.15 AN	26.03.15 AN
3	ET7203	Wireless and Mobile Communication	28.01.15 FN	17.02.15 FN	09.03.15 FN	27.03.15 FN
4	ET7204	Software for Embedded Systems	28.01.15 AN	17.02.15 AN	09.03.15 AN	27.03.15 AN
5	ET7005	ADHOC Networks	29.01.15 FN	18.02.15 FN	10.03.15 FN	30.03.15 FN
6	ET7007	RISC Processor Architecture and Programming	29.01.15 AN	18.02.15 AN	10.03.15 AN	30.03.15 AN

MODEL THEORY

Sl. NO	DATE	SUB.CODE	SUBJECT
1	21.04.2015	ET7201	VLSI Architecture and Design Methodologies
2	22.04.2015	ET7202	Embedded networking
3	23.04.2015	ET7203	Wireless and Mobile Communication
4	24.04.2015	ET7204	Software for Embedded Systems
5	27.04.2015	ET7005	ADHOC Networks
6	28.04.2015	ET7007	RISC Processor Architecture and Programming

ET7201 VLSI ARCHITECTURE AND DESIGN METHODOLOGIES

UNIT I CMOS DESIGN

WEEK 1: Overview of digital VLSI design Methodologies- Logic design with CMOS-transmission gate circuits

WEEK 2: Clocked CMOS-dynamic CMOS circuits, Bi-CMOS circuits

WEEK 3: Layout diagram, Stick diagram-IC fabrications – Trends in IC technology.

UNIT TEST-I

UNIT II PROGRAMABLE LOGIC DEVICES

WEEK 4: Programming Techniques-Anti fuse-SRAM-EPROM and EEPROM technology

WEEK 5: Re-Programmable Devices Architecture- Function blocks, I/O blocks, Interconnects

WEEK 6 : Xilinx- XC9500, Cool Runner - XC-4000, XC5200, SPARTAN, Virtex - Altera MAX 7000-Flex 10KStratix

UNIT TEST-II

UNIT III BASIC CONSTRUCTION, FLOOR PLANNING, PLACEMENT AND ROUTING

WEEK 7: System partition – FPGA partitioning – Partitioning methods

WEEK 8: floor planning – placement physical design flow – global routing

WEEK 9: detailed routing – special routing circuit extraction –DRC

UNIT TEST-III

UNIT IV ANALOG VLSI DESIGN

WEEK 10: Introduction to analog VLSI- Design of CMOS 2stage-3 stage Op-Amp

WEEK 11: High Speed and High Frequency op-amps

WEEK 12: Super MOS-Analog primitive cells, realization of neural networks.

UNIT TEST-IV

UNIT V LOGIC SYNTHESIS AND SIMULATION

WEEK 13: Overview of digital design with Verilog HDL, hierarchical modeling concepts

WEEK 14 : Modules and port definitions, gate level modeling, data flow modeling, behavioral modeling, Task & functions

WEEK 15:, Verilog and logic synthesis-simulation Design examples, Ripple carry Adders, Carry Look ahead Adders,Multiplier, ALU, Shift Registers, Multiplexer

WEEK 16:, Comparator, Test Bench.

MODEL EXAM

WEEK17: MODEL PRACTICAL EXAM

BOOKS FOR REFERENCE:

1. M.J.S Smith, "Application Specific integrated circuits",Addition Wesley Longman Inc.1997.
- 2.Kamran Eshraghian,Douglas A.pucknell and Sholeh Eshraghian,"Essentials of VLSI circuits and system", Prentice Hall India,2005.
3. Wayne Wolf, " Modern VLSI design " Prentice Hall India,2006.
4. Mohamed Ismail ,Terri Fiez, "Analog VLSI Signal and information Processing", McGraw Hill International Editions,1994.
- 5.Samir Palnitkar, "Veri Log HDL, A Design guide to Digital and Synthesis" 2nd Ed,Pearson,2005.
6. John P. Uyemera "Chip design for submicron VLSI cmos layout and simulation ", Cengage Learning India Edition", 2011.

ET7202 EMBEDDED NETWORKING

UNIT I EMBEDDED COMMUNICATION PROTOCOLS

WEEK 1: Embedded Networking: Introduction – Serial/Parallel Communication

WEEK 2: Serial communication protocols -RS232 standard – RS485 – Synchronous Serial Protocols

WEEK 3: Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I²C) – PC Parallel port programming -ISA/PCI Bus protocols –Firewire

UNIT TEST-I

UNIT II USB AND CAN BUS

WEEK 4: USB bus – Introduction – Speed Identification on the bus – USB States

WEEK 5: USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC 18 Microcontroller-USB Interface

W E E K 6 : C Programs –CAN Bus – Introduction - Frames –Bit stuffing –Types of errors – Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN.

UNIT TEST-II

UNIT III ETHERNET BASICS

WEEK 7: Elements of a network – Inside Ethernet – Building a Network

WEEK 8: Hardware options – Cables, Connections and network speed – Design choices:

WEEK 9: Selecting components –Ethernet Controllers Using the internet in local and internet communications – Inside the Internet protocol

UNIT TEST-III

UNIT IV EMBEDDED ETHERNET

WEEK 10 Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data

WEEK 11: Serving web pages that respond to user Input

WEEK 12: Email for Embedded Systems – Using FTP, Keeping Devices and Network secure.

UNIT TEST-IV

UNIT V WIRELESS EMBEDDED NETWORKING

WEEK 13: Wireless sensor networks – Introduction – Applications

WEEK 14 : Network Topology – Localization –Time Synchronization - Energy efficient MAC protocols

WEEK 15: SMAC ,Energy efficient and robust routing,Data Centric routing

WEEK 16: MODEL PRACTICAL EXAM

WEEK 17: MODEL EXAM

BOOKS FOR REFERENCE:

1. Frank Vahid, Givargis ‘Embedded Systems Design: A Unified Hardware/Software Introduction’, Wiley Publications
2. Jan Axelson, ‘Parallel Port Complete’ , Penram publications
3. Dogan Ibrahim, ‘Advanced PIC microcontroller projects in C’, Elsevier 2008
4. Jan Axelson ‘Embedded Ethernet and Internet Complete’, Penram publications
5. Bhaskar Krishnamachari, ‘Networking wireless sensors’, Cambridge press 2005

ET7203 WIRELESS AND MOBILE COMMUNICATION

UNIT I INTRODUCTION

WEEK 1: Wireless Transmission – signal propagation

WEEK 2: spread spectrum – Satellite Networks

WEEK 3: Capacity Allocation – FAMA – DAMA – MAC

UNIT TEST-I

UNIT II MOBILE NETWORKS

WEEK 4: Cellular Wireless Networks – GSM – Architecture

WEEK 5: Protocols – Connection Establishment– Frequency Allocation

WEEK 6 : Routing – Handover – Security – GPRA

UNIT TEST-II

UNIT III WIRELESS NETWORKS

WEEK 7: Wireless LAN IEEE 802.11 Standard-Architecture

WEEK 8: Services – AdHoc Network

WEEK 9: Hiper Lan – Blue Tooth.

UNIT TEST-III

UNIT IV ROUTING

WEEK 10: Mobile IP – DHCP, AdHoc Networks

WEEK 11: Proactive and Reactive Routing Protocols

WEEK 12: Multicast Routing

UNIT TEST-IV

UNIT V TRANSPORT AND APPLICATION LAYERS

WEEK 12: TCP over Adhoc Networks – WAP – Architecture

WEEK 13 : WWW Programming Model

WEEK 14: WDP –WTLS – WTP

WEEK 15: WSP – WAE – WTA Architecture WML – WML scripts.

WEEK 16: MODEL PRACTICAL EXAM

WEEK 17: MODEL EXAM

BOOKS FOR REFERENCE:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, “ Principles of Wireless Networks’ PHI/Pearson Education, 2003
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “ Principles of Mobile computing”, Springer, New york, 2003.
3. C.K.Toh, “ AdHoc mobile wireless networks”, Prentice Hall, Inc, 2002.
4. Charles E. Perkins, “ Adhoc Networking”, Addison-Wesley, 2001.
5. Jochen Schiller, “ Mobile communications”, PHI/Pearson Education, Second Edition, 2003.
6. William Stallings, “ Wireless communications and Networks”, PHI/Pearson Education, 2002.

ET7204 SOFTWARE FOR EMBEDDED SYSTEMS

UNIT I EMBEDDED PROGRAMMING

WEEK 1: C and Assembly - Programming Style - Declarations and Expressions - Arrays, Qualifiers and Reading Numbers

WEEK 2: Decision and Control Statements - Programming Process - More Control Statements - Variable Scope and Functions

WEEK 3: C Preprocessor - Advanced Types – Simple Pointers - Debugging and Optimization – In-line Assembly

UNIT TEST-I

UNIT II C PROGRAMMING TOOLCHAIN IN LINUX

WEEK 4: C preprocessor - Stages of Compilation - Introduction to GCC

WEEK 5: Debugging with GDB – The Make utility - GNU Configure and Build System - GNU Binary utilities

WEEK 6 : Profiling - using *gprof* -Memory Leak Detection with *valgrind* - Introduction to GNU C Library

UNIT TEST-II

UNIT III EMBEDDED C AND EMBEDDED OS

WEEK 7: Adding Structure to ‘C’ Code: Object oriented programming with C, Header files for Project and Port, Examples.

WEEK 8: Meeting Real-time constraints: Creating hardware delays - Need for timeout mechanism - Creating loop timeouts, Creating hardware timeouts. Creating embedded operating system:

WEEK 9: 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 TEST-III

UNIT IV TIME-DRIVEN MULTI-STATE ARCHITECTURE AND HARDWARE

WEEK 10: Multi-State systems and function sequences: Implementing multi-state (Timed) system - Implementing a Multi-state (Input/Timed) system. Using the Serial Interface

WEEK 11: RS232 - The Basic RS-232 Protocol - Asynchronous data transmission and baud rates - Flow control

WEEK 12: Software architecture - Using on-chip UART for RS-232 communication - Memory requirements, the serial menu architecture - Examples. Case study: Intruder alarm system
UNIT TEST-IV

UNIT V EMBEDDED JAVA

WEEK 13: Introduction to Embedded Java and J2ME – Smart Card basics

WEEK 14: Java card technology overview – Java card objects

WEEK 15: Java card applets working with APDUs, Web Technology for Embedded Systems.

WEEK 16: MODEL PRACTICAL EXAM

WEEK 17: MODEL EXAM

BOOKS FOR REFERENCE:

1. Steve Oualline, 'Practical C Programming 3rd Edition', O'Reilly Media, Inc, 2006.
2. Stephen Kochan, "Programming in C", 3rd Edition, Sams Publishing, 2009.
3. Michael J Pont, "Embedded C", Pearson Education, 2007.
4. Zhiqun Chen, 'Java Card Technology for Smart Cards: Architecture and Programmer's Guide', Addison-Wesley Professional, 2000.

ET7005 ADHOC NETWORKS

UNIT I WIRELESS LAN, PAN, WAN AND MAN

WEEK 1: Characteristics of wireless channel, Fundamentals of WLANs

WEEK 2: IEEE 802.11 standard, HIPERLAN Standard, First-, Second-, and third- generation cellular systems

WEEK 3: WLL, Wireless ATM, IEEE 802.16 standard, HIPERACCESS, AdHoc Wireless Internet.

UNIT TEST-I

UNIT II MAC, ROUTING AND MULTICAST ROUTING PROTOCOLS

WEEK 4: MAC Protocols: Design issues, goals and classification, Contention –based protocols with reservation and scheduling mechanisms, Protocols using directional antennas.

WEEK 5: Routing protocols: Design issues and classification, Table-driven, On-demand and Hybrid routing protocols, Routing protocols with efficient flooding mechanisms, Hierarchical and power-aware routing protocols

WEEK 6: Multicast Routing Protocols: Design issues and operation, Architecture Reference model, classification, Tree-based and Mesh-based protocols, Energy-efficient Multicasting.

UNIT TEST-II

UNIT III TRANSPORT LAYER AND SECURITY PROTOCOLS

WEEK 7: Transport layer Protocol: Design issues, goals and classification, TCP over AdHoc wireless Networks

WEEK 8: Security, Security requirements, Issues and challenges in security provisioning Network

security attacks, Security routing.

WEEK 9: Quality of Service: Issues and challenges in providing QoS. Classification of QoS solutions, MAC layer solutions, Network layer solutions, QoS frameworks.

UNIT TEST-III

UNIT IV ENERGY MANAGEMENT

WEEK 10: Need, classification of battery management schemes, Transmission power management schemes

WEEK 11: System power management schemes, Wireless Sensor Networks: Architecture

WEEK 12: Data dissemination Data gathering, MAC protocols, location discovery, Quality of a sensor network..

UNIT TEST-IV

UNIT V PERFORMANCE ANALYSIS

WEEK 13: ABR beaconing, Performance parameters

WEEK 14: Route-discovery time, End-to-end delay Performance Communication throughput performance,

WEEK 15: Packet loss performance Route Reconfiguration /repair time, TCP/IP based applications.

WEEK 16: MODEL PRACTICAL EXAM

WEEK 17: MODEL EXAM

BOOKS FOR REFERENCE:

1. C. Siva Ram Murthy and B.S. Manoj, AdHoc Wireless Networks: Architectures and protocols, Prentice Hall PTR, 2004
2. C.-K. Toh, AdHoc Mobile Wireless Networks: Protocols and Systems, Prentice Hall PTR, 2001
3. Mohammad Ilyas, The Handbook of AdHoc Wireless Networks, CRC press, 2002
4. Charles E. Perkins, AdHoc Networking, Addison – Wesley, 2000
5. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, Mobile AdHoc Networking, Wiley – IEEE press, 2004

ET7007 RISC PROCESSOR ARCHITECTURE AND PROGRAMMING

UNIT I AVR MICROCONTROLLER ARCHITECTURE

WEEK 1: Architecture – memory organization – addressing modes

WEEK 2: I/O Memory – EEPROM – I/O Ports

WEEK 3: SRAM –Timer –UART – Interrupt Structure- Serial Communication with PC – ADC/DAC Interfacing.

UNIT TEST-I

UNIT II ARM ARCHITECTURE AND PROGRAMMING

WEEK 4: Arcon RISC Machine – Architectural Inheritance- Core & Architectures

WEEK 5: The ARM Programmer's model -Registers – Pipeline - Interrupts – ARM organization

WEEK 6 : ARM processor family – Co-processors. Instruction set – Thumb instruction set – Instruction cycle timings.

UNIT TEST-II

UNIT III ARM APPLICATION DEVELOPMENT

WEEK 7: Introduction to DSP on ARM –FIR Filter – IIR Filter – Discrete Fourier transform – Exception Handling

WEEK 8: Interrupts – Interrupt handling schemes- Firmware and boot loaderExample: Standalone

WEEK 9: Embedded Operating Systems. Fundamental Components - Example Simple little Operating System

UNIT TEST-III

UNIT IV MEMORY PROTECTION AND MANAGEMENT

WEEK 10: Protected Regions-Initializing MPU, Cache and Write Buffer-MPU to MMU

WEEK 11: Virtual Memory-Page Tables, TLB-Domain

WEEK 12: Memory Access Permission-Fast Context Switch Extension.

UNIT TEST-IV

UNIT V DESIGN WITH ARM MICROCONTROLLERS

WEEK 12: Assembler Rules and Directives- Simple ASM/C programs- Hamming Code

WEEK 13 : Division-Negation

WEEK 14: Simple Loops

WEEK 15: Look up table, Block copy- subroutines.

WEEK 16: MODEL PRACTICAL EXAM

WEEK 17: MODEL EXAM

REFERENCES

1. Steve Furber, ‘ARM system on chip architecture’, Addison Wesley
2. Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield ‘ARM System Developer’s Guide Designing and Optimizing System Software’, Elsevier 2007.
3. Trevor Martin, ‘The Insider's Guide To The Philips ARM7-Based Microcontrollers, An Engineer's Introduction To The LPC2100 Series’ Hitex (UK) Ltd.,
4. Dananjay V. Gadre ‘Programming and Customizing the AVR microcontroller’, McGraw Hill 2001
5. William Hohl, ‘ ARM Assembly Language’ Fundamentals and Techniques.
5. ARM Architecture Reference Manual
6. LPC213x User Manual
7. R. Barnett , L. O’ CULL and S. Cox “ Embedded C Programming and Atmel AVR”, Delmar Cengage Learning, India Edition , 2009.

ET7211 EMBEDDED SYSTEM LABORATORY II

LIST OF EXPERIMENTS

1. Programming with ARM Processors Both Assembly and C programming, I/O Programming/Timers/Interrupts, /ADC/DAC/ LCD /RTC Interfacing/ Sensor Interfacing/i/o device control

2. Programming with Fixed Point & Floating Point DSP Processors Both Assembly /C programming/CCS Compilers- Programming with DSP processors for Correlation, Convolution, Arithmetic adder, Multiplier, Design of Filters - FIR based , IIR
3. Design using Xilinx/Altera CPLD Design and Implementation of simple Combinational/Sequential Circuits
4. Design using Xilinx/Altera FPGA Design and Implementation of simple Combinational/Sequential Circuits
5. Interfacing: Motor Control/ADC/DAC/LCD / RTC Interfacing/ Sensor Interfacing
6. Study of one type of Real Time Operating Systems (RTOS) with ARM Processor/Microcontroller
7. Network Simulators Communication Topology of network using NS2/simulators
8. Study on Embedded wireless network Topology
9. Simulation of digital controllers using programming environments
10. Simulation & Programming on DSP /Image Processing using programming environments