Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)

Evaluation Scheme & Syllabus for

M.Tech

EMBEDDED SYSTEM TECHNOLOGY
(DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING)
(I to IV Semester)

EVALUATION SCHEME

M.TECH- EMBEDDED SYSTEM TECHNOLOGY

Semester-I

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS. (30)	EXT. (70)	SESS. (25)	EXT .(25)	
MTES-101	Applied Mathematics	30	70	NA	NA	100
MTES-102	VLSI system	30	70	NA	NA	100
MTES -103	Embedded Controller	30	70	NA	NA	100
MTES -104	Embedded programming	30	70	NA	NA	100
MTES -105	Embedded Networks and Protocols	30	70	NA	NA	100
MTES -106	Digital Instrumentation	30	70	NA	NA	100
MTES -107	Embedded System Lab- I	NA	NA	25	25	50

Semester-II

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS. (30)	EXT. (70)	SESS. (25)	EXT. (25)	
MTES -201	Embedded System Design	30	70	NA	NA	100
MTES -202	Multiprocessor System on Chip	30	70	NA	NA	100
MTES- 203	Real Time System	30	70	NA	NA	100
MTES- 204	Embedded Communication Software Design	30	70	NA	NA	100
MTES - 205	Digital Signal Processor	30	70	NA	NA	100
MTES - 206	Design of Embedded Control System	30	70	NA	NA	100
MTES - 207	Research Methodology	30	70	NA	NA	100
MTES - 208	Embedded System Lab- II	NA	NA	25	25	50

Semester-III

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.	EXT	SESS.	EXT.	
MTES -301	Dissertation phase-I	NA	NA	250	250	500
MTES - 302	Seminar	NA	NA	50	50	100

Semester-IV

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT. (70)	SESS. (25)	EXT. (25)	
MTES -401	Dissertation phase-II	NA	NA	300	300	600

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I Year I Semester
MTES-101 APPLIED MATHEMATICS

CLASSICAL OPTIMIZATIONTECHNIQUES

Statement of optimization problem – classification – optimization technique -Unconstrained Optimization–Equality constraints–Inequality constraints– Lagrange Multiplier method–Kuhn-Tucker Condition-Indirect search methods– Gradient of a function–Steepest descent method– Conjugate gradient method– Newton's method.

LINEARPROGRAMMING

Standard form of linear programming problem– definitions and theorems –Solution of linear simultaneous quations–Simplexalgorithm–graphicalmethod–Dualsimplexmethod–Transportation problem- Applications.

MATRIXTHEORY

Matrix Norms-Jordan Canonical form Generalized Eigenvectors-Singular Value Decomposition-Pseudo Inverse- Least square Approximations–QR Algorithm.

PROBABILITYANDRANDOMPROCESS

Probability-Random Process variables-Binomial, Poisson, Geometric, Uniform Normal, and Exponential Distributions - Moment generating functions and their properties- Functions of random variables.

QUEUING THEORY

Single and multiple server Mark ovian queuing models-Customer impatience-Queuing applications.

TEXT BOOK

1. Singiresu S.Rao, Engineering Optimization: Theory and Practice, 3rd Edition, New Age International (P) Ltd,2001
2. Gupta S.C. and Kapoor V.K. Fundamentals of Mathematical Statistics: a mode approach, sultan Chand, 10th Edition, New Delhi2001
3. Lewis. D.W. Matrix Theory, Allied Publishers, Chennai 1995.

REFERENCES

1. S.C.Sharma, Operations Research, Discovery Publishing house, New Delhi2006.
2. M.K.Ochi.,Applied Probability and Stochastic processes, John Wiley &s ons1992.
3. Bronson.R. Matrix operations, Schaums outline series, Tata Mcgraw Hill, NewYork,2011.

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I Year I Semester
MTES-102 VLSI SYSTEM

SEQUENTIAL CIRCUIT DESIGN

Overview of IC technology-Digital hardware components-Design process of digital hardware - Analysis of Clocked Synchronous Sequential Networks (CSSN), Modeling of CSSN–State Stable Assignment and Reduction-Analysis of Asynchronous Sequential Circuit (ASC)–Flow Table Reduction–State Assignment, Problem and the Transition Table –Design of ASC.

PROGRAMMABLE DEVICES

EPROM to Realize a Sequential Circuit – Programmable Logic Devices – DesigningaSynchronousSequentialCircuitusingaPAL–EPROM–RealizationState machine using PLD - Complex Programmable Logic Devices and Field Programmable Gate Arrays- Altera Series FPGA sand Xilinx Series FPGAs.

HARDWARE DESCRIPTIONLANGUAGES

Introduction to VHDL-Types of modeling- Behavioral Modelling– Transportvs. Inertial Delay-Simulation Deltas-Sequential Processing-Process Statement– Signal Assignment vs. Variable Assignment - Sequential Statements - Data Types-Subprograms and Packages- Predefined Attributes- Configurations– Subprogram Overloading- VHDL synthesis- Design Examples.

VHDL CODE

Design and testing BCDAdders, multiplexer, Demultiplexer, Encoder, Decoder, ALU, RAM, flip flops, registers, Latches Counters circuits using VHDL- Synchronous versus Asynchronous Circuits design -Implement state machines using VHDL codes–Design of a Simple Microprocessor.

TESTINGOFLOGICAL CIRCUITS

Fault model-Hazards-Fault diagnosis and test ability algorithms, Fault Table Method – Path Sensitization Method – Boolean Difference Method - KohaviAlgorithm–ToleranceTechniques-TestGeneration–MaskingCycle-DFT Schemes- Built-in Self Test.

TEXT BOOKS:

1. Stephen Brown and Zvonk Vranesic, “Fundamentals of digital logic with VHDL Design” TataMc Graw Hill, 2005
2. Dueck,“Digital Design with CPLD Application and VHDL” Cengage Learning;2edition(September 9, 2011).
3. Brain Holds worth, Clive Woods, “Digital logic Design”Newnes; 4edition (December 17, 2002)

REFERENCE BOOKS:

1. John M Yarbrough,“Digital Logic applications and Design” ThomsonLearning,2001.
2. Nripendra N Biswas,“Logic Design Theory” Prentice Hall of India,2001.

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P.K. University, Shivpuri (MP)

I Year I Semester
MTES-103 EMBEDDED CONTROLLER

8051 ARCHITECTURE

Architecture –memory organization –addressing modes–instruction set–Timers- Interrupts-I/O ports, Interfacing I/O Devices–Serial Communication

8051PERIPHERALS

Assembly language programming–Arithmetic Instructions–Logical Instructions–Single bit Instructions–Timer Counter Programming–Serial Communication Programming Interrupt Programming.

ARMPROCESSORFUNDAMENTALS

ARM Programmer's Model – Registers – Processor Modes – State of the processor–Condition Flags– ARM Pipelines–Exception Vector Table–ARM Processor Families–Introduction to ARM Memory Management Unit-Addressing Modes–ARM Instruction Set Overview–Thumb Instruction Set Overview– LPC210XARM Processor Features

ARMASSEMBLY CODE

Writing Assembly Code-Profiling and Cycle Counting-Instruction Scheduling- Register Allocation - Conditional Execution- Looping Constructs - Bit Manipulation- Efficient Switches- Contents-Handling Unaligned Data

OPTIMIZEDPRIMITIVES ANDINTERRUPT HANDLING

Double-Precision Integer Multiplication - Integer Normalization and CountLeadingZeros–Division-SquareRoots-TranscendentalFunctions:log,exp,sin, cos –Endian Reversal and Bit Operations-Saturated and Rounded Arithmetic- Random Number Generation Exception Handling-Interrupts-Interrupt Handling Schemes

TEXT BOOKS

1. 8051Microcontroller & Embedded systems By Madizi M.A.
2. Andrew Sloss, Dominic Symes, Chris Wright**,** ARM System Developer's Guide: Designing and Optimizing System Software Morgan Kaufmann Publisher,2004

REFERENCES

1. Myke Predko, "Programming and customizing the 8051microcontroller", Tata McGrawHill2001.
2. Muhammad Ali Mazidi, Janice G.Mazidi and Rolin D.Mc Kinlay, The 8051 Microcontroller and Embedded Systems "Prentice Hall, 2005.
3. Rajkamal, "Microcontrollers-Architecture, Programming, Interfacing &System Design", 2nd edition, Pearson Education 2012.

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I Year I Semester
MTES-104 EMBEDDED C PROGRAMMING

PROGRAMMING IN C

IntroductiontoC-Datatypes–Structures–Functions–Arrays–Pointers–strings-Helloworldprogram-SuperLooparchitecture-delay function- Controlling the port pins- Reading switches- Basic techniques for reading and writing the port pins–Dealing with switch bounce- Adding structure to 1your code.

EMBEDDEDC

Selection of processors - programming language -operating system- Object- oriented programming with C- The Project Header (MAIN.H)–The Port Header (PORT.H)Meetingreal-timeconstraints-Creating„hardwaredelays"usingTimer-needfor„timeout"mechanisms-Creatingloop timeouts-Testing loop time outs–Creating hardware timeout- Testing a hardware timeout.

MULTI-STATE SYSTEMS ANDFUNCTIONSEQUENCES INC

Introduction-Implementing a Multi-State (Timed)system -Traffic light sequencing- Implementing a Multi-State (Input/Timed) system -Controller for a washing machine Using theserialinterface-BasicRS-232protocol- Asynchronous data transmissionandbaudrates-Flowcontrol-Thesoftwarearchitecture-Usingtheon-chipUARTforRS-232communications-Memoryrequirements-Displaying elapsed time onaPC225- The Serial-Menu architecture 237- Data acquisition.

INTERRUPTS ANDSOFTWARE ARCHITECTURES

Microprocessor Architecture- Interrupt Basics- The shared- Data Problem-Interrupt Latency-Round Robin with Interrupts-function-queue- scheduling Architecture- Real Time Operating Architecture-selecting an Architecture

EMBEDDEDSOFTWARE DEVELOPMENT

Host and target machines-Linker/Locators for Embedded Software- Getting
Embedded Software into the target system-testing on your Host Machine- Instruction set simulator-
The assert Macro-Using Laboratory Tools

TEXT BOOKS:

1. Michael J. Pont,"Embedded C"Addison Wesley, Pearson Education Limited2002.
2. David E.Simon," An Embedded Software Primer, Pearson Education Limited2005

REFERENCE BOOKS:

1. Michael Barr, Programming Embedded System sin C and C++Publisher:O'Reilly1999
2. .2. Jean Lab rosse ,Jack Ganssle, Tammy Noergaard, Robert Oshana, Colin Walls, 2007
3. Keith Curtis, Jason Andrews, DavidJ. Katz,Rick Gentile, Kamal Hyder, Bob,2007
4. Perrin,"Embedded Software" Elsevier2008.

Department of Electrical & Electronics Engineering
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I Year I Semester
MTES-105 EMBEDDED NETWORKS AND PROTOCOLS

INTRODUCTION TO CAN

The CAN bus-General-Concepts of bus access and arbitration-Error processing and management-From concept or reality-Patents, licenses and certification– CANprotocol:„ISO11898-1"-ContentofthedifferentISO/OSIlayersoftheCAN bus-Compatibility of CAN2.0AandCAN2.0B.

ETHERNET BASICS

Elements of a network–Inside Ethernet–Building a Network: Hardware options –Cables, Connections and network speed–Design choices: Selecting components –EthernetControllers–Usingtheinternetinlocalandinternetcommunications–Inside the Internet protocol.

EMBEDDEDETHERNET

Exchanging messages using UDP and TCP–Serving web pages with Dynamic Data– Serving web pages that respond to user Input – Email for Embedded Systems–Using FTP –Keeping Devices and Network secure.

INDUSTRIAL NETWORKING PROTOCOL

LIN–LocalInterconnectNetwork-BasicconceptoftheLIN2.0protocol-Fail- Safe SBC–Gateways-Managing the application layers-Safe-by-Wire-Safe-by- WirePlus-Audio-videobuses-I2CBus-D2B (Domestic digital)bus-MOST(Media oriented systems transport)bus- IEEE1394busor „FireWire"- profibus.

RFCOMMUNICATION

Radio-frequency communication: internal and external - Remote control of opening parts-passive go--Wirelessnetworks-GSM-Bluetooth-IEEE802.11x- NFC (near-field communication).

TEXT BOOKS:

1. Dominique Paret, "Multiplexed Networks for Embedded Systems- CAN, LIN, Flexray, Safe-by-Wire..." John Wiley & Sons Ltd- 2007.
2. Jan Axelson ,Embedded Ethernet and Internet Complete", Penram publications, 2003.

REFERENCE BOOKS:

1. Glaf P. Feiffer, Andrew Ayre and Christian Keyold, "Embedded networking With CAN and CAN open".EmbeddedSystemAcademy2005.
2. Gregory J. Pottie,William J. Kaiser "Principles of Embedded Networked Systems Design", Cambridge UniversityPress, Second Edition,2005.
3. Alan Holub, "Compiler Construction In C Prentice Hall,2005

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I Year I Semester
MTES-106 DIGITAL INSTRUMENTATION

DATA ACQUISITION SYSTEMS

Overview of A/D converter, types and characteristics – Sampling , Errors. Objective – Building blocks of Automation systems –Counters – Modes of operation- Frequency, Period, Time interval measurements, Pre scaler, Heterodyne converter for frequency measurement, Single and Multi channel Data Acquisition systems.

INTERFACING AND DATA TRANSMISSION

Data transmission systems – 8086 Microprocessor based system design –Peripheral Interfaces– Time Division Multiplexing (TDM) – Digital Modulation – Pulse Modulation – Pulse Code Format – Interface systems and standards – Communications.

INSTRUMENTATION BUS

Introduction, Modem standards, Basic requirements of Instrument Bus standards, Bus communication, interrupt and data handshaking, Interoperability, interchangeability for RS-232, USB, RS-422, RS-485.

VIRTUAL INSTRUMENTATION

Block diagram and Architecture – Data flow techniques – Graphical programming using GUI – Real time Embedded system –Intelligent controller – Software and hardware simulation of I/O communication blocks-peripheral interface – ADC/DAC – Digital I/O – Counter , Timer.

CASE STUDIES

PC based DAS, Data loggers; PC based industrial process measurements like flow, temperature, pressure and level development system, CRT interface and controller with monochrome and color video display.

TEXT BOOKS

1. Automotive Computer and Digital Instrumentation, Robert N. Brady, Brady, 1988
2. Digital and Analogue Instrumentation, A.D.V.N. Kularatna, Institution of Engineering and Technology, 2002

REFERENCE BOOKS

1. A.J. Bouwens, "Digital Instrumentation", TATA McGraw-Hill Edition,1998.
2. N. Mathivanan, "Microprocessors,PC Hardware and Interfacing", Prentice-Hall India, 2005.
3. H S Kalsi, "Electronic Instrumentation" Second Edition, Tata McGraw- Hill, 2006.
4. Joseph J. Carr, "Elements of Electronic Instrumentation and Measurement" Third Edition, Pearson Education, 2003.
5. Buchanan, "Computer busses", Arnold, London, 2000.

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I Year I Semester

MTES-107 EMBEDDED SYSTEM LABORATORY - I

1. Arithmetic operations- ASM level in 8051.
2. Number Conversion (ASM) and sorting programs in embedded C.
3. Serial communication in ASM.
4. Interrupt handling in ASM.
5. Serial communication in embedded C.
6. Interrupt handling in embedded C.
7. Interfacing display devices (Seven segment, LCD).
8. Interfacing of RTC through I2C protocol with LCD display.
9. Interfacing of ADC/DAC with LCD display.
10. Design of a temperature monitoring/controlling system using fuzzy algorithm.
11. Arithmetic operations- ASM level.
12. Interrupt handling in embedded C.
13. Design of Real time clock within built RTC and LCD.

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(Faculty of Engineering & Technology)
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I Year II Semester
MTES-201 EMBEDDED SYSTEM DESIGN

INTRODUCTION

Embedded design life cycle – product specification – hardware / software partitioning, detailed hardware and software design, integration, product testing.

SELECTIONPROCESS ANDPARTIONING DECISION

Selection processes–Performance–Measuring tools-Meaningful bench marking, RTOS availability, tool chain availability, other issues in selection processes partitioning decision–hardware/ software duality, coding hardware–application specific integrated circuit revolution–managing the risk, co-verification.

DEVELOPMENT ENVIRONMENTS

Execution environment, memory organization, system startup–hardware manipulation–memory, mapped access, speed and coded ensity Software techniques-Interrupt service routines–watch dog timers–flash memory basic toolset–host and debugging–remoted e bugging–read only memory emulators, logic analyzer.

INCIRCUIT EMULATORS

BDM, JTAG, and Nexus–Background debug mode–ICE- Bulletproof run control–real time trace, hardware break points–timing constraints– triggers setting.

TESTING

Testing, bug tracking, reduction of risks and costs–performance– unit testing, regression testing, choosing test cases–functional tests, and coverage tests, testing embedded software.

TEXT BOOK

1. Arnold S. Berger, Embedded System Design CMP books, USA2002.

REFERENCES

1. Wayne Wolf, Computers as Components: Principles of Embedded Computer Systems Design, Morgan Kaufman Publishers, 2004.
2. Jean J. Lab rosse Embedded Systems Building Blocks: Complete and Ready- To- Use Modulesin C,CMP Books, 2005.
3. David E. Simon, An Embedded Software Primer, Perason education, 2003.

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I Year II Semester
MTES-202 MULTI PROCESSOR SYSTEM ON CHIP

FUNDAMENTALS OF MPSoC

Introduction to SoC- MP SoCs- Challenges- Design Methodologies–Hardware Architectures- Software- Energy-Aware Processor Design- Energy-Aware Memory System Design-Energy-Aware On-Chip Communication System Design- Energy- Aware Software.

NETWORKS ONCHIP

Technology Trends-Signal Transmission on Chip- Micronetwork Architecture and Control-Software Layers-Architecture of Embedded Microprocessors– Embedded Versus High-Performance Processors A Common Foundation- Pipelining Techniques-Survey of General-purpose32-bitEmbedded Microprocessors- Virtual Simple Architecture (VISA):Integrating Non- Determinism Without Under mining Safety.

PERFORMANCEMODELING ANDANALYSIS FOR MPSoC DESIGN

The Limitations of Traditional ASIC Design - Extensible Processors as an Alternative to RTL - Toward Multiple - Processor SoCs - Processors and Disruptive Technology – Complex Hetero generous Architectures- Design Challenges-State of the Practice- Chapter Objectives-Structuring Performance Analysis-Architecture Component Performance Modeling and Analysis-Process Execution Modeling – Modeling Shared Resources- Global Performance Analysis.

ARCHITECTURES ANDRTOS FOR MPSoC

On-Chip Communication Architectures-System-Level Analysis for Designing Communication Architectures-Design Space Exploration for Customizing Communication Architectures- Adaptive Communication Architectures- Communication Architectures for Energy/Battery-Efficient Systems – Platform Architecture-Tasks-Basics of Scheduling-Basic System Model–Uniprocessor Systems-Multiprocessor Systems.

APPLICATION BASED DESIGN FOR MPSoC

ASIC to System and Network on Chip-Basics for MPSoC Design Models for Component Abstraction Component - Based Design Environment Memory Wrapper Generation-Component-based Design of a VDSL Application-Case studies.

TEXT BOOK

1. Wayne Wolf, “Multiprocessor Systems-on-Chips”, Morgan Kaufmann Publishers, 2005.

REFERENCE

1. Joseph A. Fisher, Paolo Fara boschi and Cliff Young, “Embedded Computing” Morgan Kaufmann Publishers, 2005.

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I Year II Semester
MTES-203 REAL TIME SYSTEMS

PERATING SYSTEM CONCEPTS

Basic Principles-Operating System structures–System Calls–Files–Processes–Design and Implementation of processes– Communication between processes– Introduction to Distributed operating system–issues in distributed system: states, events, clocks-Distributed scheduling-Fault & recovery

REAL-TIME OPERATING SYSTEMS

Terminology-Real-Time System Design Issues-Example Real-Time Systems-Common Misconceptions- Real-Time Kernels-Pseudo kernels-Interrupt-Driven Systems-Preemptive-Priority Systems- Hybrid Systems-The Task-Control Block Model-Process Scheduling-Round-Robin Scheduling-Cyclic Executives-Fixed- Priority Scheduling–Rate-Monotonic Approach-Dynamic-Priority Scheduling: Earliest-Deadline–First Approach

INTERTASK COMMUNICATION, SYNCHRONIZATION AND MEMORYMANAGEMENT

BufferingData-Time-RelativeBuffering-RingBuffers-Mailboxes-Queues-Critical Regions-Semaphores-Other Synchronization Mechanisms-Deadlock-Priority Inversion-Process Stack Management-Run-Time Ring Buffer-Maximum Stack Size-Multiple-Stack Arrangements-Memory Management in the Task-Control-
Block Model-Swapping-Overlays-Block or Page Management-Replacement Algorithms-Memory Locking-Working Sets-Real-Time Garbage Collection- Contiguous File Systems-Building versus Buying Real-Time Operating Systems- Selecting Real-Time Kernels.

SOFTWARE REQUIREMENTS ENGINEERING

Requirements-Engineering process-Types of Requirements-Requirements Specification for Real-Time Systems-Formal Methods in Software Specification- Limitations of Formal Methods-Z-Finite State Machines-State charts-Petri Nets- Requirements Analysis with Petri Nets- Structured Analysis and Design-Object- Oriented Analysis and the Unified Modelling Language-Organizing the Requirements Document-Organizing and Writing Requirements-Requirements Validation and Review

CASESTUDY: POSIX ANDSOFTWARE REQUIREMENTS ENGINEERING

POSIX-Threads-POSIX Mutexes and Condition Variables-POSIX Semaphores-
Using Semap hores and Shared Memory-POSIX Messages-Real-Time POSIX Signals-Clocks and Timers-Asynchronous Input and Output-POSIX Memory Locking-
SoftwareRequirementsSpecificationforFour-WayTrafficIntersectionTraffic Light Controller System

TEXTBOOKS: 1. D.M. Dhamdhere," OperatingSystems,AConcept-BasedApproch,TMH,2008
2. JeanJ. Labrosse "µC/OS, The Real-Time Kernel", CRC Press;2 edition,2002

REFERENCE BOOKS:1. Silberschatz, Galvin, Gagne" OperatingSystemConcepts,6thed,John Wiley,2003
2. C.M.Krishna, Kang,G.Shin,"Real Time Systems",Mc Graw Hill, 1997.
3. Herma K., "Real Time Systems–Design for distributed Embedded Applications", Kluwer Academic,1997.s

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I Year II Semester
MTES-204 EMBEDDED COMMUNICATION SOFTWARE DESIGN

COMMUNICATION

Open system interconnect reference model – communication devices –Communication echo system–design consideration–host based communication–embedded communication system – operating system vs. real time operating system.

SOFTWARE PARTITIONING

Limitation of strict layering – tasks and modules – modules and task decomposition– layer2switch–layer3switch/routers–protocolimplementation –management types –debugging protocols.

TABLES ANDDATASTRUCTURES

Partitioning of structures and tables– implementation– speeding up access–table resizing – table access routines – buffer and timer management – third party protocol libraries.

MANAGEMENT SOFTWARE

Device management–management schemes–router management–management
Of sub system architecture–device to manage configuration–system start up and configuration.

MULTIBOARDCOMMUNICATIONSOFTWARE DESIGN

Multiboardarchitecture–singlecontrolcardandmultiplelinescardarchitecture–Interface for multi board software–failures and fault–tolerance in multi board systems – hardware independent development – using a COTS board – Development environment–test tools.

TEXT BOOK

1. Sridhar T, Designing Embedded Communication Software, CMP Books, 2004.

REFERENCE

1. Greg Utas, Robust Communication Software,Wiley-Blackwell,2004.

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I Year II Semester
MTES-205 DIGITAL SIGNAL PROCESSOR

ARCHITECTURES FORPROGRAMMABLE DSPDEVICES

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

EXECUTIONCONTROL ANDPIPELINING

Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

PROGRAMMABLE DIGITAL SIGNAL PROCESSORS

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XXProcessors.

IMPLEMENTATIONOF FFT ALGORITHMS

An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An8-Point FFT implementation on the TMS320C54XX,Computation of the signal spectrum.

VLSIIMPLEMENTATION

Low power Design-need for Low power VLSI chips-Basics of DSP system architecture design Using VHDL programming, Mapping of DSP algorithm on to hardware, Realisation of MAC & Filter structure.

TEXT BOOKS

1. Digital Signal Processing–Avtar Singh and S.Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features–Lapsleyet al.S. Chand & Co,2000.

REFERENCE BOOKS

1. Digital Signal Processors, Architecture, Programming and Applications–B. Venkata Ramaniand M.Bhaskar, TMH,2004.
2. Digital Signal Processing–Jonatham Stein, JohnWiley,2005

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I YEAR II SEMESTER
MTES-206 DESIGN OF EMBEDDED CONTROL SYSTEM

EMBEDDEDSYSTEMORGANIZATION

Embedded computing– characteristics of embedded computing applications –Embedded system design challenges; Build process of Real time Embedded system– Selection of processor; Memory; I/O devices-Rs-485, MODEM, Bus Communication system using I2C,CAN,USB buses,8bit–ISA, EISA bus;

REAL-TIME OPERATING SYSTEM

Introduction to RTOS; RTOS-Inter Process communication, Interrupt driven Input and Output-Non mask able interrupt, Software interrupt; Thread–Single, Multi thread concept; Multitasking Semaphores.

INTERFACE WITH COMMUNICATIONPROTOCOL

Design methodologies and tools–design flows–designing hardware and software Interface–system integration; SPI, High speed data acquisition and interface-SPI read/write protocol, RTC interfacing and programming;

DESIGNOFSOFTWARE FOREMBEDDEDCONTROL

Software abstraction using Mealy-Moore FSM controller, Layered software development, Basic conceptsofdevelopingdevicedriver–SCI–Software-interfacing&porting using standard C &C++; Functional and performance Debugging with bench marking Real-time system software–Survey on basics of contemporary RTOS–VX Works, UC/OS-II

CASE STUDIES WITH EMBEDDEDCONTROLLER

Programmable interface with A/D & D/A interface; Digital voltmeter, control- Robot system;-PWM motor speed controller, serial communication interface.

REFERENCE BOOKS

1. Steven F. Barrett, Daniel J. Pack, "Embedded Systems – Design and Applications with the 68HC 12andHCS12", Pearson Education, 2008.
2. Raj Kamal,"EmbeddedSystems-Architecture,ProgrammingandDesign"TataMcGraw Hill,2006.
3. Micheal Khevi, "The M68HC11 Microcontroller application in control, Instrumentation& Communication",PH NewJersy,1997.
4. Chattopadhyay,"Embedded System Design",PHI Learning, 2011.
5. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey, "PIC Microcontroller and Embedded Systems- Using Assembly & C for PIC18", Pearson Education, 2008.
6. Steven F.Barrett, Daniel J.Pack," Embedded Systems-Design & Application with the 68HC12 & HCS12",Pearson Education,2008.

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I YEAR II SEMESTER
MTES-207 RESEARCH METHODOLOGY

UNIT- I

Introduction: Definition and objectives of Research–Types of research, Various Steps in Research process, Mathematical tools for analysis, Developing a research question-Choice of a problem Literature review, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation, Research Purposes, Ethics in research–APA Ethics code.

Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing.

REFERENCE BOOKS

1. C.R.Kothari, Research Methodology Methods and Techniques, 2/e,Vishwa Prakashan, 2006
2. Donald H.Mc Burney, Research Methods, 5th Edition, Thomson Learning, ISBN:81-315-0047-0,2006

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I Year II Semester

MTES-208 EMBEDDED SYSTEM LAB - II

1. Realization of round robin scheduling.
2. Realization of Inter task communication.
3. Realization of Inter task synchronization.
4. Programmable read only memory programming.
5. VHDL implementation of a sequential machine with various Flip-Flops.
6. VHDL implementation of an ALU.
7. VHDL implementation of matrix multiplication.
8. Filer design using TMS Processor.
9. Fixed point operation Arithmetic operation in ASM level.
10. Floating point Arithmetic operation in ASM level.
11. Circular buffer operation in C.
12. Convolution operation.
13. Filter design/FFT implementation.