M.E. (EMBEDDED SYSTEM)

SYLLABI 2015

Department of Electronics and Communication Engineering
FACULTY OF ENGINEERING

KARPAGAM ACADEMY OF HIGHER EDUCATION
(Established Under Section 3 of UGC Act 1956)
Eachanari post, COIMBATORE 641 021, INDIA
SEMESTER - I

15MECC101     APPLIED MATHEMATICS     3 1 0 4 100

OBJECTIVES:

| To teach the fundamental concepts of integral equations and mathematical modeling of the problems |
| To study about Calculus of variations and Random Process |
| To teach transforms and its applications |

OUTCOMES:
The students will be able to:

| Problem of a cryptosystem numerically |
| Acquires the knowledge of special functions and applications of modelling |
| Able to solve ordinary faction numerically. |

UNIT - I   UNIT – I   INTEGRAL EQUATIONS


UNIT - II   CALCULUS OF VARIATIONS

Variation and its properties – Euler’s equation – Functional dependent on first and higher order derivatives – Functional dependent on functions of several independent variables – Some applications – Direct methods: Ritz and Kantorovich methods.

UNIT - III   LINEAR PROGRAMMING

Basic concepts – Graphical and Simplex methods –Transportation problem – Assignment problem.

UNIT – IV   Z – TRANSFORMS


UNIT – V   RANDOM PROCESSES


TEXT BOOKS:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of Publication</th>
</tr>
</thead>
</table>
REFERENCES:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of Publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Gupta.A.S.</td>
<td>Calculus of Variations with Applications</td>
<td>Prentice Hall of India, New Delhi</td>
<td>1999</td>
</tr>
</tbody>
</table>

WEBSITES:

1. www.phpsimplex.com
2. www.mathyards.com
3. www.mathworld.com
15MEES102  ADVANCED DIGITAL SYSTEM DESIGN  3 0 0 3 100

OBJECTIVE:
1. To introduce methods to analyze and design synchronous and asynchronous sequential circuits
2. To introduce variable entered maps and techniques to simplify the Boolean expressions using these maps
3. To explain the design procedures for developing complex system controllers using digital ICs

OUTCOMES:
1. Ability to analyze and design sequential digital circuits
2. Ability to understand the requirements and specifications of the system required for a given application
3. Decide a suitable system controller architecture
4. Design system controllers using different digital ICs

UNIT I  SEQUENTIAL CIRCUIT DESIGN

UNIT II  ASYNCHRONOUS SEQUENTIAL CIRCUIT DESIGN

UNIT III  FAULT DIAGNOSIS AND TESTABILITY ALGORITHMS

UNIT IV  SYNCHRONOUS DESIGN USING PROGRAMMABLE DEVICES

UNIT V  SYSTEM DESIGN USING VHDL

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Donald G. Givone</td>
<td>Digital principles and Design</td>
<td>Tata McGraw Hill, New Delhi</td>
<td>2002</td>
</tr>
<tr>
<td>2</td>
<td>John M Yarbrough</td>
<td>Digital Logic applications and Design</td>
<td>Thomson Learning, United Kingdom</td>
<td>2001</td>
</tr>
<tr>
<td></td>
<td>Author(s)</td>
<td>Title</td>
<td>Publisher</td>
<td>Year</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------</td>
<td>------------------------------------------------------------</td>
<td>------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>3</td>
<td>Charles H. Jr. Roth</td>
<td>Digital System Design using VHDL</td>
<td>Thomson Learning, United Kingdom</td>
<td>1998</td>
</tr>
</tbody>
</table>
OBJECTIVE:
1. To introduce methods to analyze and design synchronous and asynchronous sequential circuits
2. To explain the design procedures for developing complex system controllers using embedded system

OUTCOMES:
5. Ability to analyze and design an embedded system
6. Ability to understand the requirements and specifications of the system required for a given application

UNIT – I PRINCIPLES OF EMBEDDED SYSTEM

UNIT – II ARM PROCESSOR FUNDAMENTALS

UNIT – III CACHES AND MMU

UNIT - IV OPTIMIZED PRIMITIVES

UNIT - V WRITING AND OPTIMIZING ARM ASSEMBLY CODE

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Andrew N.Sloss, Dominic Symes, Chris Wright</td>
<td>ARM System Developer’s Guide</td>
<td>Morgan Kaufmann</td>
<td>2008</td>
</tr>
<tr>
<td>2</td>
<td>Tammy Noergaard</td>
<td>Embedded Systems Architecture</td>
<td>Newnes</td>
<td>2008</td>
</tr>
<tr>
<td>3</td>
<td>Steve Furbe</td>
<td>ARM System-on-Chip Architecture</td>
<td>Addison-Wesley Professional</td>
<td>2000</td>
</tr>
</tbody>
</table>
OBJECTIVE:
1. To explore the concepts of Multi-rate signal processing by study DFT, Computation and design of Multi rate filters
2. To study the adaptive filters and its applications
3. To establish fundamental concepts on signal processing in modern spectral estimation

OUTCOMES:
1. Able to apply knowledge from undergraduate engineering and other disciplines to identify, formulate, solve novel advanced electronics engineering along with soft computing problems that require advanced knowledge within the field
2. Able to apply advanced technical knowledge in multiple contexts
3. Able to understand and design advanced electronics systems (Analog and Digital Systems) and conduct experiments, analyze and interpret data
4. Able to analysis, design and testing of systems that include both hardware and software.

UNIT - I DISCRETE RANDOM SIGNAL PROCESSING

UNIT – II LINEAR ESTIMATION AND PREDICTION

UNIT – III ADAPTIVE FILTERS

UNIT - IV MULTIRATE DIGITAL SIGNAL PROCESSING

UNIT - V DIGITAL SIGNAL PROCESSORS
<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monson H. Hayes,</td>
<td>Statistical Digital Signal</td>
<td>John Wiley and Sons Inc.,</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Processing and Modeling.</td>
<td>New York</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>New Delhi</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>New Delhi</td>
<td></td>
</tr>
</tbody>
</table>
15MEES105 MICROCONTROLLER SYSTEM DESIGN AND APPLICATIONS
OBJECTIVE:
1. To explore the concepts of controller processing design
2. To establish fundamental concepts on signal processing in modern spectral estimation
OUTCOMES:
1. Able to apply knowledge from undergraduate engineering and other disciplines to identify, formulate, solve novel advanced electronics engineering along with soft computing problems that require advanced knowledge within the field
2. Able to apply advanced technical knowledge in multiple contexts

UNIT – I 8051 ARCHITECTURE

UNIT - II PERIPHERALS AND INTERFACING

UNIT - III 8096 ARCHITECTURE

UNIT - IV PERIPHERALS AND INTERFACING

UNIT – V CASE STUDY FOR 8051 AND 8096
Real Time clock – DC Motor Speed Control – Generation of Gating Signals for Converters and Inverters – Frequency Measurement – Temperature Control

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>John B.Peatman,</td>
<td>Design with Micro controllers</td>
<td>McGraw Hill international Limited, Singapore.</td>
<td>1989</td>
</tr>
<tr>
<td>2</td>
<td>Michael Slater</td>
<td>Microprocessor based design A comprehensive guide to effective Hardware design</td>
<td>Prentice Hall, New Jersey</td>
<td>1989</td>
</tr>
<tr>
<td>3</td>
<td>Ayala, Kenneth</td>
<td>The 8051 Microcontroller</td>
<td>Prentice Hall, New Jersey</td>
<td>2000</td>
</tr>
<tr>
<td>4</td>
<td>Muhammad Ali Mazidi, Janice Gillispie mazidi</td>
<td>The 8051 Microcontroller and Embedded systems</td>
<td>Person Education</td>
<td>2009</td>
</tr>
</tbody>
</table>
PRACTICAL

15MEVA*51          VALUE ADDED COURSE – I          2 0 0 2 100

15MEES111          EMBEDDED SYSTEMS LAB I           0 0 3 2 100

LIST OF EXPERIMENTS

1 Micro controller 8051/8031/8096 & Flash controller programming
   (a) Simple application programs with kit and through assembler
   (b) Data flash with erase, verify, fusing through ATMEL and INTEL tools.

2 Testing RTOS Environment and System Programming.
   (a) Keil Tools
   (b) RTOS System Solutions with Tornado tools.

3 Complex Programmable Logic Devices and Device Programming with VHDL
   fitter and Cool runner
   (a) Warp tools-Cypress-Active HDL Simulator & Galaxy-VHDL, FSM models
   (b) Mixed signal handling.

4 Third party design tools
   (a) Mentor Graphics
   (b) Cadence.
   (c) Model Sim
SEMESTER – II

15MEES201 REAL TIME EMBEDDED OPERATING SYSTEMS 3 0 0 3 100

OBJECTIVE:
1. To provide the students with an understanding of the aspects of the Operating systems and Real-time Operating Systems.

OUTCOMES:
After successful completion of the module, the students shall be able to
1. understand the Embedded Real Time software that is needed to run embedded systems.
2. illustrate the differences between various types of system software (real-time, information systems, fault tolerant).

UNIT - I INTRODUCTION TO EMBEDDED SYSTEM
Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection &tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT - II OPERATING SYSTEM OVERVIEW

UNIT - III TASK MANAGEMENT

UNIT - IV SEMAPHORE MANAGEMENT AND MESSAGE PASSING

UNIT - V MEMORY MANAGEMENT
Memory Management: Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block. Getting Started with μC/OS-II – Installing μC/OS-II – Porting μC/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with μC/OS-II - μC/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of μC/OS-II.
<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jean J. Labrosse</td>
<td>MicroC/OS – II The Real Time Kernel</td>
<td>CMP BOOKS</td>
<td>2009</td>
</tr>
<tr>
<td>3</td>
<td>Steve Furbe,</td>
<td>ARM System-on-Chip Architecture,</td>
<td>Addison-Wesley Professional, California</td>
<td>2000</td>
</tr>
</tbody>
</table>
OBJECTIVE:

1. To study the fundamentals of embedded networking
2. To understand about the design methodologies in wireless networks.

OUTCOMES:
1. Able to design, execution and evaluation of experiments on embedded platforms.
2. Able to analysis, design and testing of systems that include both hardware and software.

UNIT – I INTRODUCTION

UNIT - II NETWORKING CONFIGURATION
CAN open configuration – Evaluating system requirements choosing devices and tools – Configuring single devices – Overall network configuration – Network simulation – Network Commissioning – Advanced features and testing.

UNIT - III CONTROLLER AREA NETWORK
Controller Area Network – Underlying Technology CAN Overview – Selecting a CAN Controller – CAN development tools.

UNIT - IV IMPLEMENTATION
Implementing CAN open Communication layout and requirements – Comparison of implementation methods – Micro CAN open – CAN open source code – Conformance test – Entire design life cycle.

UNIT - V COMMUNICATION OBJECTS

REFERENCE

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Glaf P,Feiffer, Andrew Ayre and Christian Keystold</td>
<td>Embedded Networking with CAN and CAN open</td>
<td>Embedded System Academy</td>
<td>2005</td>
</tr>
</tbody>
</table>
15MEES203  EMBEDDED CONTROL SYSTEMS  3 0 0 3 100

OBJECTIVE:

1. To study the fundamentals of embedded control systems
2. To understand about the design methodologies in control systems.

OUTCOMES:

1. Able to design, execution and evaluation of experiments on embedded platforms.
2. Able to analysis, design and testing of systems that include both hardware and software.

UNIT - I  INTRODUCTION
Controlling the hardware with software – Data lines – Address lines - Ports – Schematic representation – Bit masking – Programmable peripheral interface – Switch input detection – 74 LS 244

UNIT - II  INPUT-OUTPUT DEVICES

UNIT - III  D/A AND A/D CONVERSION
R 2R ladder - Resistor network analysis - Port offsets - Triangle waves analog vs. digital values - ADC0809 – Auto port detect - Recording and playing back voice - Capturing analog information in the timer interrupt service routine - Automatic, multiple channel analog to digital data acquisition.

UNIT - IV  ASYNCHRONOUS SERIAL COMMUNICATION

UNIT - V  CASE STUDIES: EMBEDDED C PROGRAMMING
Multiple closure problems – Basic outputs with PPI – Controlling motors – Bidirectional control of motors – H bridge – Telephonic systems – Stepper control – Inventory control systems.

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jean J. Labrosse</td>
<td>Embedded Systems Building Blocks: Complete and Ready-</td>
<td>R&amp;D</td>
<td>1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To-Use Modules in C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jersey</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Daniel W. Lewis</td>
<td>Fundamentals of Embedded Software where C and Assembly</td>
<td>PHI, New Delhi</td>
<td>2005</td>
</tr>
</tbody>
</table>
15MEES2E**  ELECTIVE I  3 0 0 3 100

15MEES2E**  ELECTIVE II  3 0 0 3 100

15MEVA*51  VALUE ADDED COURSE – II  2 0 0 2 100

PRACTICAL

15MEES211  EMBEDDED SYSTEMS LAB II  0 0 3 2 100

LIST OF EXPERIMENTS

1 VLSI designing with various Tools and Design methodologies
   (a) AT40K FPGA series-synthesis-design-simulation of application programs.
   (b) Xilinx EDA design tools-device programming –PROM programming.
   (c) ALTERA and Mentor graphics-IC design tools.

2 Embedded DSP based System Designing.
   (a) Analog DSP tool kit.
   (b) Code compressor studio for embedded DSP using Texas tool kit.

3 IPCORE usage in VOIP Through SoC2 tools
   (a) Cypress PSoC designing Tools
   (b) SoPC designing Tools

4 Assembly Language Programming
   (a) Intel 8086 Assembly Language Programming using 8086 Assembler
   (b) MPLAB for assembly programming & PIC
SEMESTER III

15MECC301 RESEARCH METHODOLOGY PEDAGOGY & COMMUNICATION SKILLS 3 0 0 3 100

OBJECTIVES:
To make the student understand
  To introduce students to a number of perspectives on research and to broaden
  their conceptions of what research involves.
  To learn about research, design, information retrieval, problem formulation,
  use of statistical techniques
The students will be able to:
  Plan, undertake, execute research projects and prepare relevant documents. Take up
  doctoral research in their area of interest and submit the thesis and
  defend the same successfully

UNIT I HIGHER EDUCATION AN INTRODUCTION
Historical perspectives, the objectives of higher education, role of higher education-social focus,
curricular focus, administrative focus, drivers of change in higher education-globalization,
changing demographics, structuring of employment, technological change, demand of
accountability, consumerism,. Expectations by employers, rate of knowledge growth, campus
demographics, concern for community. Restructuring and new patterns of decision making.

UNIT II RESEARCH PROCESSES AND METHODOLOGY
and Safety – IPR – Research Events – Networks – Outreach Activities – Best Research practices
Journal critiques.

UNIT III EFFECTIVE RESEARCH SKILLS
Data collection – Modeling – Simulation – Analysis – Prototyping – Presentation Skills – Data
Presentation Skills – Research Writing skills (For Articles, Reports, Journals and Thesis) –
Creative Skills – Effective Interview Skills – Team Building Skills – Communication and
Interpersonal Skills – knowledge Transfer skills – Vivo voice – Teaching and Information Skills
– Effective use of Library – Survey Skills – Planning and Control Methods – Statistical Tools –
Patents and Copyrights – Advanced Research Techniques and Tools.

UNIT IV TECHNIQUES OF TEACHING AND EVALUATION
Large group techniques – lecture, seminar, symposium, panel discussion-project approaches and
workshop. Small Group techniques-group discussion simulation, role playing-Buzz techniques,
brain storming, case discussion and assignment…system approach in education. Individualized
techniques-CAI Keller plan – PSI and programmed learning-methods of evaluation-self
evaluation and student evaluation in higher education, question banking, diagnostic testing and
remedial teaching.

UNIT V ESSENTIALS FOR EFFECTIVE COMMUNICATION IN ENGLISH
Improving Vocabulary stock-general and technical vocabulary-British and American vocabulary-
homophones & homonyms, idioms and phrases-Different grammatical functions of the same
word-Grammar-Tenses, Voice, reported speech, Modals, spoken English structures, formal and
informal-letters, project reports, descriptions, circulars, synopsis and summary writing.
Listening skills for competitive exams-Reading skills-skimming and scanning – Reading
journals, magazines and newspapers for comprehension. Practical use of English – conversation, seminars, individual speeches and group discussions. Reference skills-Using dictionary, thesaurus and encyclopedia effectively. Error shooting for better use of English.

**TEXT BOOKS**

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alley, Michael</td>
<td>The Craft of Scientific Writing</td>
<td>Springer</td>
<td>1996</td>
</tr>
<tr>
<td>2</td>
<td>Alley, Michael</td>
<td>The Craft of Scientific Presentations</td>
<td>Springer</td>
<td>2003</td>
</tr>
</tbody>
</table>

**REFERENCES**

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hubbuch, Susan.M</td>
<td>Writing Research Papers Across the Curriculum</td>
<td>Thompson, Florida</td>
<td>2005</td>
</tr>
<tr>
<td>2</td>
<td>Vedanayagam.E.G</td>
<td>Teaching technology for college teachers</td>
<td>Sterling publishers (Pvt) Ltd, New Delhi</td>
<td>1989</td>
</tr>
<tr>
<td>3</td>
<td>Kumar.K.H</td>
<td>Educational technology</td>
<td>New age international Pvt., Ltd, New Delhi</td>
<td>2005</td>
</tr>
</tbody>
</table>

**WEB SITES**

www.english4engineer.com  
www.learn4good.com/language/engineer
15MEES302 SOFTWARE TECHNOLOGY FOR EMBEDDED SYSTEMS

OBJECTIVE:

1. To study the fundamentals of embedded systems
2. To understand about the design methodologies in software systems.

OUTCOMES:

1. Able to design, execution and evaluation of experiments on embedded platforms.
2. Able to analysis, design and testing of systems that include both hardware and software.

UNIT - I  BASIC CONCEPTS IN OBJECT-ORIENTED METHODOLOGY
Benefits of object-oriented methodology. Class & Objects - Definitions - How to determine the object and classes, where to look, what to look for, what to consider and challenge, examples. Identifying structures: Definitions - generalization - specialization, whole-part structures, examples. Definitions - examples. Defining attributes - Definitions - How to determine the attributes, Instance connections, examples. Defining services, message connections, specifying services, final class and object specification examples.

UNIT - II  OBJECT ORIENTED ANALYSIS

UNIT - III  OBJECT ORIENTED SYSTEMS DEVELOPMENT
Introduction to object oriented systems development – Procedure oriented paradigms – Procedure oriented development tools – Object Oriented paradigm – Object Oriented notations and graphs – Steps in Object Oriented Analysis – Steps in Object Oriented Analysis – Steps in Object Oriented design – Prototyping paradigm - Approach to Object Oriented Design – The programming problem – The CRC modeling team – Constructing the CRC cards – Use Cases – Class relationships – Class Diagrams

UNIT - IV  UNIFIED MODELING LANGUAGE

UNIT - V  CASE STUDIES
Multi threaded applications – Assembling embedded applications – Polled waiting loop and interrupt driven I/O – Preemptive kernels and shared resources – System timer – Scheduling – Client server computing
## REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Peter Coad and Edward Yourdon</td>
<td>Object Oriented Analysis</td>
<td>Prentice Hall</td>
<td>1999</td>
</tr>
<tr>
<td>2</td>
<td>Peter Coad and Edward Yourdon</td>
<td>Object Oriented Design</td>
<td>Prentice Hall</td>
<td>1997</td>
</tr>
<tr>
<td>4</td>
<td>Hassan Gomma</td>
<td>Designing concurrent, distributed, and Real-Time applications with UML</td>
<td>Addison-Wesley</td>
<td>2000</td>
</tr>
</tbody>
</table>

15MEES2E**  ELECTIVE III  3 0 0 3 100
15MEES2E**  ELECTIVE IV  3 0 0 3 100
15MEES2E**  ELECTIVE V  3 0 0 3 100
15MEVA*51  VALUE ADDED COURSE – I II  2 0 0 2 100
15MEES391  PROJECT WORK (PHASE I)  0 0 12 4 100

SEMESTER IV

15MEES491  PROJECT WORK – VIVA VOCE(PHASE II)  0 0 18 12 300
LIST OF ELECTIVES

15MEES_E01 ADVANCED EMBEDDED SYSTEMS II 3 0 0 3 100

OBJECTIVE:
1. To teach the Fundamentals on design attributes of functional units of a Processor
2. To discuss on Hardware software partitioning in system design

OUTCOMES:
1. To understand intra & Inter processor Communications
2. To understand the strategies for processor Communications

UNIT - I INTRODUCTION

UNIT - II REAL TIME OPERATING SYSTEM
Task and Task states – Task and data – Semaphore and shared data operating system services – Message queues timing functions – Events – Memory management – Interrupt routines in an RTOS environment – Basic design using RTOS.

UNIT – III EMBEDDED HARDWARE, SOFTWARE AND PERIPHERALS

UNIT – IV MEMORY AND INTERFACING

UNIT - V CONCURRENT PROCESS MODELS AND HARDWARE SOFTWARE CO-DESIGN

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>David. E.Simon</td>
<td>An Embedded Software Primer</td>
<td>Pearson Education</td>
<td>2005</td>
</tr>
<tr>
<td>2</td>
<td>Frank Vahid and Tony Gwargie</td>
<td>Embedded System Design</td>
<td>Elserien</td>
<td>2002</td>
</tr>
<tr>
<td>3</td>
<td>John Wiley &amp; sons, Steve Heath</td>
<td>Embedded System Design</td>
<td>Elserien</td>
<td>2004</td>
</tr>
</tbody>
</table>
OBJECTIONS:
1. To teach the students on fundamentals of image analysis.
2. To teach the methods to improve image qualities.

OUTCOMES:
1. To understand different image transforms.
2. To understand the fundamentals of image compression.

UNIT – I    DIGITAL IMAGE FUNDAMENTALS
Elements of digital image processing systems, Elements of visual perception, psycho visual model, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals - RGB, HSI models, Image acquisition and sampling, Quantization, Image file formats, Two-dimensional convolution, correlation, and frequency responses.

UNIT – II    IMAGE TRANSFORMS
1D DFT, 2D transforms – DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Radon, and Wavelet Transform.

UNIT – III    IMAGE ENHANCEMENT AND RESTORATION

UNIT - IV    IMAGE SEGMENTATION AND RECOGNITION

UNIT – V    IMAGE COMPRESSION
Need for image compression, Huffman, Run Length Encoding, Arithmetic coding, Vector Quantization, Block Truncation Coding. Transform Coding – DCT and Wavelet. Image compression standards.

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rafael C. Gonzalez, Richard E.Woods</td>
<td>Digital Image Processing</td>
<td>Pearson Education, Inc.</td>
<td>2004</td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>--------------------------</td>
<td>----------------------</td>
<td>------</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OBJECTIVES:
1. Get to know about the genetic concepts and it’s algorithms
2. Apply Evolutionary Computation Methods to find solutions to complex problems

OUTCOMES:
Upon completion of this course, students will be able to:
1. Explain the of the principles underlying Evolutionary Computation in general and Genetic Algorithms in particular.
2. Analyze and experiment with parameter choices in the use of Evolutionary Computation

UNIT I INTRODUCTION

UNIT II GENETIC ALGORITHMS
Genetic technology: steady state algorithm - fitness scaling - inversion. Genetic programming - Genetic Algorithm in problem solving

UNIT III GENETIC ENGINEERING
Genetic Algorithm in engineering and optimization-natural evolution –Simulated annealing and Tabu search .Genetic Algorithm in scientific models and theoretical foundations.

UNIT IV IMPLEMENTATION
Implementing a Genetic Algorithm – computer implementation - low level operator and knowledge based techniques in Genetic Algorithm.

UNIT V OPTIMIZATION
Applications of Genetic based machine learning-Genetic Algorithm and parallel processors, composite laminates, constraint optimization, multilevel optimization, real life problem.

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Melanie Mitchell</td>
<td>An introduction to Genetic Algorithm</td>
<td>Prentice-Hall of India, New Delhi</td>
<td>2007</td>
</tr>
<tr>
<td>2</td>
<td>David.E.Golberg</td>
<td>Genetic algorithms in search, optimization and machine learning</td>
<td>Addision-Wesley.</td>
<td>1999</td>
</tr>
</tbody>
</table>
OBJECTIVE:
1. To expose the students to the fundamentals of wireless communication technologies.
2. To teach the fundamentals of wireless network routing protocols
3. To introduce energy management in network routing protocols

OUTCOMES:
1. To study on wireless issues in network layers topologies
2. To study the basis of performance metrics for N/W communication Technologies

UNIT I   WIRELESS LAN, PAN, WAN AND MAN

UNIT II   MAC, ROUTING AND MULTICAST ROUTING PROTOCOLS

UNIT III   TRANSPORT LAYER AND SECURITY PROTOCOLS

UNIT IV    ENERGY MANAGEMENT
Need, classification of battery management schemes, Transmission power management schemes, System power management schemes. Wireless Sensor Networks: Architecture, Data dissemination, Date gathering, MAC protocols, location discovery, Quality of a sensor network.

UNIT V   PERFORMANCE ANALYSIS
ABR beaconing, Performance parameters, Route-discovery time, End-to-end delay performance, Communication throughput performance, Packet loss performance, Route reconfiguration/repair time, TCP/IP based applications.
## REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C. Siva Ram Murthy and B.S. Manoj, AdHoc Wireless Networks</td>
<td>Architectures and protocols,</td>
<td>Prentice Hall PTR</td>
<td>2004</td>
</tr>
<tr>
<td>2</td>
<td>C.-K.Toh,</td>
<td>AdHoc Mobile Wireless Networks</td>
<td>Prentice Hall PTR</td>
<td>2001</td>
</tr>
<tr>
<td>3</td>
<td>Mohammad Ilyas</td>
<td>The Handbook of AdHoc Wireless Networks</td>
<td>CRC press</td>
<td>2002</td>
</tr>
<tr>
<td>4</td>
<td>Charles E. Perkins</td>
<td>AdHoc Networking</td>
<td>Addison – Wesley</td>
<td>2000</td>
</tr>
</tbody>
</table>
OBJECTIVE:
1. To teach the Fundamentals on design attributes of functional units of a Processor
2. To discuss on Hardware software partitioning in system design

OUTCOMES:
1. To understand intra & Inter processor Communications
2. To understand the strategies for processor Communications

UNIT I OSI REFERENCE MODEL
Communication Devices – Communication Echo System – Design Consideration – Host Based Communication – Embedded Communication System – OS Vs RTOS.

UNIT II SOFTWARE PARTITIONING

UNIT III TABLES & OTHER DATA STRUCTURES

UNIT IV MANAGEMENT SOFTWARE

UNIT V MULTI BOARD COMMUNICATION SOFTWARE DESIGN

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sridhar .T</td>
<td>Designing Embedded Communication Software</td>
<td>CMP Books</td>
<td>2003</td>
</tr>
<tr>
<td>2</td>
<td>Comer.D</td>
<td>Computer networks and Internet</td>
<td>Prentice Hall</td>
<td>2001</td>
</tr>
</tbody>
</table>
OBJECTIVE:

OUTCOMES:

UNIT I THEORY OF PARALLELISM
Parallel Computer models – the state of computing, Multiprocessors and Multicomputer and Multivectors and SIMD computers, PRAM and VLSI models, Architectural development tracks, Program and network properties – Conditions of parallelism.

UNIT II PARTITIONING AND SCHEDULING
Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures, Principles of scalable performance – performance matrices and measures, Parallel processing applications, speedup performance laws, scalability analysis and approaches.

UNIT III HARDWARE TECHNOLOGIES
Processor and memory hierarchy advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology, bus cache and shared memory – backplane bus systems, cache memory organizations, shared memory organizations, sequential and weak consistency models.

UNIT IV PIPELINING AND SUPERSCALAR TECHNOLOGIES
Parallel and scalable architectures, Multiprocessor and Multicomputer, Multi vector and SIMD computers, Scalable, Multithreaded and data flow architectures.

UNIT V SOFTWARE AND PARALLEL PROCESSING
Parallel models, Languages and compilers, Parallel program development and environments, UNIX, MACH and OSF/1 for parallel computers.

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>David E. Culler, Jaswinder Pal Singh with Anoop Gupta</td>
<td>Parallel Computer Architecture</td>
<td>Elsevier</td>
<td>2004</td>
</tr>
<tr>
<td>3</td>
<td>John P. Shen</td>
<td>Modern processor design Fundamentals of super scalar processors</td>
<td>Tata McGraw Hill</td>
<td>2003</td>
</tr>
<tr>
<td>4</td>
<td>Sajjan G. Shiva</td>
<td>Advanced Computer Architecture</td>
<td>Taylor &amp; Francis</td>
<td>2008</td>
</tr>
</tbody>
</table>
UNIT I  NETWORK FUNDAMENTALS
Data communication networking – Data transmission concepts – Communication networking - Overview of OSI- TCP/IP layers – IP addressing - DNS – Packet Switching – Routing – Fundamental concepts in SMTP, POP, FTP, Telnet, HTML, HTTP, URL, SNMP,ICMP.

UNIT II  DATA COMMUNICATION
Sensor data acquisition, Sampling, Quantization, Filtering ,Data Storage, Analysis using compression techniques, Data encoding – Data link control – Framing, Flow and Error control, Point to point protocol, Routers, Switches , Bridges – MODEMs, Network layer –Congestion control , Transport layer- Congestion control, Connection establishment.

UNIT III  VIRTUAL INSTRUMENTATION

UNIT IV  MEASUREMENT AND CONTROL THROUGH INTERNET
Web enabled measurement and control-data acquisition for Monitoring of plant parameters through Internet – Calibration of measuring instruments through Internet, Web based control – Tuning of controllers through Internet

UNIT V  BASED MEASUREMENT AND CONTROL
Simulation of signal analysis & controller logic modules for Virtual Instrument control – Case study of systems using VI for data acquisition, Signal analysis, controller design, Drives control.

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wayne Tomasi</td>
<td>Introduction to Data communications and Networking</td>
<td>Pearson Education</td>
<td>2007.</td>
</tr>
<tr>
<td>2</td>
<td>Al Williams</td>
<td>Embedded Internet Design</td>
<td>TMH</td>
<td>2007.</td>
</tr>
<tr>
<td>4</td>
<td>Behrouza A Forouzan</td>
<td>Data Communications and Networking</td>
<td>TMH</td>
<td>2007.</td>
</tr>
<tr>
<td>5</td>
<td>Krishna Kant</td>
<td>Computer based Industrial control</td>
<td>PHI</td>
<td>2002.</td>
</tr>
</tbody>
</table>
OBJECTIVE:
1. To teach the students properties of materials, microstructure and fabrication methods.
2. To teach the design and modeling of Electrostatic sensors and actuators.
3. To teach the characterizing thermal sensors and actuators through design and Modeling.

OUTCOME:
1. To teach the fundamentals of piezoelectric sensors and actuators.
2. To give exposure to different MEMS and NEMS devices.

UNIT I MEMS: MICRO-FABRICATION, MATERIALS AND ELECTROMECHANICAL CONCEPTS
Overview of micro fabrication – Silicon and other material based fabrication processes – Concepts: Conductivity of semiconductors-Crystal planes and orientation-stress and strain-flexural beam bending analysis-torsional deflections-Intrinsic stress- resonant frequency and quality factor.

UNIT II ELECTROSTATIC SENSORS AND ACTUATION
Principle, material, design and fabrication of parallel plate capacitors as electrostatic sensors and actuators-Applications

UNIT III THERMAL SENSING AND ACTUATION
Principle, material, design and fabrication of thermal couples, thermal bimorph sensors, thermal resistor sensors-Applications.

UNIT IV PIEZOELECTRIC SENSING AND ACTUATION
Piezoelectric effect-cantilever piezo electric actuator model-properties of piezoelectric materials-Applications.

UNIT V CASE STUDIES
Piezoresistive sensors, Magnetic actuation, Micro fluidics applications, Medical applications, Optical MEMS.

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chang Liu</td>
<td>Foundations of MEMS</td>
<td>Prentice Hall</td>
<td>2006</td>
</tr>
<tr>
<td>2</td>
<td>Marc Madou</td>
<td>Fundamentals of micro fabrication</td>
<td>CRC Press</td>
<td>1997</td>
</tr>
<tr>
<td>4</td>
<td>M.H.Bao</td>
<td>Micromechanical transducers:Pressure sensors, accelerometers and gyroscopes</td>
<td>Elsevier, New York</td>
<td>2000</td>
</tr>
</tbody>
</table>
UNIT - I  FUNDAMENTALS

UNIT - II IMPLEMENTING ADTS AND ENCAPSULATION
Aggregate Type struct – Structure Pointer Operators – Unions – Bit Fields – Data Handling and Member Functions – Classes – Constructors and Destructors – Static Member – this Pointer – reference semantics – implementation of simple ADTs.

UNIT - III POLYMORPHISM

UNIT - IV TEMPLATES

UNIT – V INHERITANCE

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ira Pohl</td>
<td>Object–Oriented Programming Using C++</td>
<td>Pearson Education</td>
<td>2003</td>
</tr>
<tr>
<td>2</td>
<td>Stanley B.Lippman, Josee Lajoie</td>
<td>C++ Primer</td>
<td>Pearson Education</td>
<td>2006</td>
</tr>
<tr>
<td>3</td>
<td>Kamthane</td>
<td>Object Oriented Programming with ANSI and Turbo C++</td>
<td>Person Education</td>
<td>2002</td>
</tr>
<tr>
<td>4</td>
<td>Bhave</td>
<td>Object Oriented Programming With C++</td>
<td>Pearson Education</td>
<td>2004</td>
</tr>
</tbody>
</table>
OBJECTIVES:
1. To study basics of biological Neural Network.
2. To study basics of artificial Neural Network
3. To study applications of ANN

OUTCOME:
1. To get an adequate knowledge about fuzzy set theory

UNIT – I  BASIC LEARNING ALGORITHMS

UNIT – II  RADIAL-BASIS FUNCTION NETWORKS AND SUPPORT VECTOR MACHINES

UNIT – III  ATTRACTOR NEURAL NETWORKS

UNIT – IV  ADAPTIVE RESONANCE THEORY

UNIT – V  SELF ORGANISING MAPS
<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
</table>
OBJECTIVE:
1. To give an insight to the students about the significance of VHDL Programming
2. To teach the importance and architectural modeling of programmable logic devices.
3. To study the Logic synthesis and simulation of digital system with PLD

OUTCOMES:
1. To understand the construction and design programming
2. To know the basic VLSI design configurations

UNIT - I VHDL FUNDAMENTALS

UNIT - II COMPOSITE DATA TYPES & BASIC MODELING CONSTRUCTS

UNIT - III SUBPROGRAMS AND PACKAGES

UNIT - IV SIGNALS, COMPONENTS, CONFIGURATIONS

UNIT - V ADTs AND FILES

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>James M.Lee</td>
<td>Verilog Quick start</td>
<td>Kluwer Publishers</td>
<td>2009</td>
</tr>
</tbody>
</table>
OBJECTIVE:
1. To study the fundamentals of operating systems
2. To understand Linux operating measurement systems.
3. To obtain basic knowledge on board support packages and device drivers.

OUTCOME:
1. Able to apply knowledge from undergraduate engineering and other disciplines to identify, formulate, solve novel advanced electronics engineering along with soft computing problems that require advanced knowledge within the field.
2. Able to understand and integrate new knowledge within the field.
3. Able to understand and design advanced electronics systems (Analog and Digital Systems) and conduct experiments, analyze and interpret data.
4. Able to design, execution and evaluation of experiments on embedded platforms.

UNIT I  FUNDAMENTALS OF OPERATING SYSTEMS

UNIT II  LINUX FUNDAMENTALS
Introduction to Linux – Basic Linux commands and concepts – Logging in - Shells - Basic text editing - Advanced shells and shell scripting – Linux File System –Linux programming - Processes and threads in Linux - Inter process communication – Devices – Linux System calls

UNIT III  INTRODUCTION TO EMBEDDED LINUX
Embedded Linux – Introduction – Advantages- Embedded Linux Distributions - Architecture - Linux kernel architecture - User space – Linux startup sequence – GNU cross platform Tool chain

UNIT IV  BOARD SUPPORT PACKAGE AND EMBEDDED STORAGE

UNIT V  EMBEDDED DRIVERS AND APPLICATION PORTING

REFERENCES:

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Matthias Kalle Dalheimer, Matt Welsh</td>
<td>Running Linux</td>
<td>O’Reilly Publications</td>
<td>2005</td>
</tr>
<tr>
<td>3</td>
<td>Mark Mitchell, Jeffrey</td>
<td>Advanced Linux</td>
<td>New Riders</td>
<td>2011</td>
</tr>
<tr>
<td></td>
<td>Authors</td>
<td>Title</td>
<td>Publisher</td>
<td>Year</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------</td>
<td>----------------------------------------------------</td>
<td>-------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>4</td>
<td>P. Raghavan, Amol Lad, Sriram Neelakandan</td>
<td>Embedded Linux System Design and Development</td>
<td>Auerbach Publications</td>
<td>2006</td>
</tr>
<tr>
<td>5</td>
<td>Karim Yaghmour</td>
<td>Building Embedded Linux Systems</td>
<td>O'Reilly Publications</td>
<td>2003</td>
</tr>
</tbody>
</table>
OBJECTIVES:
1. To understand the hardware infrastructure of distributed systems.
2. To study concepts of Internet and Embedded agent.
3. To obtain basic knowledge distributed computing using Java.

OUTCOMES:
1. Able to apply knowledge from undergraduate engineering and other disciplines to identify, formulate, solve novel advanced electronics engineering along with soft computing problems that require advanced knowledge within the field.
2. Able to understand and integrate new knowledge within the field.
3. Able to apply advanced technical knowledge in multiple contexts.
4. Able to understand and design advanced electronics systems (Analog and Digital Systems) and conduct experiments, analyze and interpret data.

UNIT I  THE HARDWARE INFRASTRUCTURE

UNIT II  INTERNET CONCEPTS
Capabilities and limitations of the internet – Interfacing Internet server applications to corporate databases HTML and XML Web page design and the use of active components.

UNIT III  DISTRIBUTED COMPUTING USING JAVA

UNIT IV  EMBEDDED AGENT

UNIT V  EMBEDDED COMPUTING ARCHITECTURE

REFERENCES:

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dietel &amp; Dietel</td>
<td>JAVA how to program</td>
<td>Prentice Hall</td>
<td>1999</td>
</tr>
<tr>
<td>2</td>
<td>Sape Mullender</td>
<td>“Distributed Systems”</td>
<td>Addison-Wesley</td>
<td>1993</td>
</tr>
<tr>
<td>3</td>
<td>George Couloris and Jean Dollimore</td>
<td>Distributed Systems – concepts and design</td>
<td>Addison –Wesley</td>
<td>1988</td>
</tr>
</tbody>
</table>
OBJECTIVE
1. To learn the basics of embedded system hardware organization.
2. To understand the basics of real time operating system.
3. To learn the design methodologies and hardware and software interface.

OUTCOMES:
1. To study the designing concepts of software for embedded system, basics of Exemplary RTOS.

UNIT I  EMBEDDED SYSTEM ORGANIZATION
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, 8 bit –ISA, EISA bus

UNIT II  REAL-TIME OPERATING SYSTEM
Introduction to RTOS; RTOS- Inter Process communication, Interrupt driven Input and Output – Non maskable interrupt, Software interrupt; Thread – Single, Multithread concept; Multitasking Semaphores.

UNIT III INTERFACE WITH COMMUNICATION PROTOCOL
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;

UNIT IV DESIGN OF SOFTWARE FOR EMBEDDED CONTROL
Software abstraction using Mealy-Moore FSM controller, Layered software development, Basic concepts of developing device driver – SCI – Software - interfacing & porting using standard C & C++ ; Functional and performance Debugging with benchmarking Real time system software – Survey on basics of contemporary RTOS – VXWorks, UC/OS-II

UNIT IV CASE STUDIES WITH EMBEDDED CONTROLLER
Programmable interface with A/D & D/A interface; Digital voltmeter, control- Robot system; - PWM motor speed controller, serial communication interface.

REFERENCES:

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Steven F. Barrett,</td>
<td>Embedded Systems – Design and Applications with the</td>
<td>Pearson Education</td>
<td>2008</td>
</tr>
<tr>
<td></td>
<td>Daniel J. Pack</td>
<td>68HC 13 and HCS13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Micheal Khevi</td>
<td>The M68HC11 Microcontroller application in control,</td>
<td>PH NewJersey</td>
<td>1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instrumentation &amp; Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Muhammad Ali</td>
<td>PIC Microcontroller and</td>
<td>Pearson Education</td>
<td>2008</td>
</tr>
<tr>
<td></td>
<td>Mazda, Rozin D. McKinlay, Danny Causey</td>
<td>Embedded Systems- Using Assembly and C for PIC18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------</td>
<td>--------------------------------------------------</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Daniel W. Lewis</td>
<td>“Fundamentals of Embedded Software”</td>
<td>Prentice Hall India 2004</td>
<td></td>
</tr>
</tbody>
</table>
OBJECTIVE:
1. To introduce robot terminologies and robotic sensors
2. To educate direct and inverse kinematic relations
3. To educate on formulation of manipulator Jacobians and introduce path planning Techniques.

OUTCOMES:
1. To educate on robot dynamics.
2. To introduce robot control techniques.

UNIT I INTRODUCTION AND TERMINOLOGIES
Definition-Classification-History- Robots components-Degrees of freedom-Robot joints coordinates- Reference frames-workspace-Robot languages-actuators-sensors- Position, velocity and acceleration sensors-Torque sensors-tactile and touch sensors proximity and range sensors-social issues

UNIT II KINEMATICS
Mechanism-matrix representation-homogenous transformation-DH representation- Inverse kinematics-solution and programming-degeneracy and dexterity

UNIT III DIFFERENTIAL MOTION & VELOCITIES
Jacobian-differential motion of frames-Interpretation-calculation of Jacobian-Inverse Jacobian-Design-Lagrangian mechanics-dynamic equations-static force analysis

UNIT IV ROBOT CONTROL SYSTEM
Sensor characteristics- Hydraulic, Pneumatic and electric actuators-trajectory planning decentralized PID control- non-linear decoupling control

UNIT V IMAGE PROCESSING & VISION SYSTEMS
Two and three dimensional images-spatial and frequency domain representation-noise and edges- convolution masks-Processing techniques-threshold-noise reduction edge detection-segmentation-Image analysis and object recognition

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Saeed B. Niku</td>
<td>Introduction to Robotics</td>
<td>Pearson Education</td>
<td>2002</td>
</tr>
</tbody>
</table>
OBJECTIVES
1. To learn the key aspects of Soft computing and Neural networks.
2. To understand the features of neural network and its applications.
3. To study the fuzzy logic components
4. To gain insight onto Neuro Fuzzy modeling and control.

OUTCOMES:
1. Implement machine learning through Neural networks.
2. Develop a Fuzzy expert system.
3. Model Neuro Fuzzy system for clustering and classification.
4. Write Genetic Algorithm to solve the optimization problem

UNIT I INTRODUCTION

UNIT II ARTIFICIAL NEURAL NETWORKS

UNIT III FUZZY LOGIC SYSTEM
Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning. Introduction to fuzzy logic modeling and control. Fuzzification, inferencing and defuzzification. Fuzzy knowledge and rule bases. Fuzzy modeling and control schemes for nonlinear systems. Self-organizing fuzzy logic control. Fuzzy logic control for nonlinear time-delay system.

UNIT IV GENETIC ALGORITHM
Basic concept of Genetic algorithm and detail algorithmic steps, adjustment of free parameters. Solution of typical control problems using genetic algorithm. Concept on some other search techniques like tabu search and anD-colony search techniques for solving optimization problems.

UNIT V APPLICATIONS

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jacek.M.Zurada</td>
<td>Introduction to Artificial Neural Systems</td>
<td>Jaico Publishing House</td>
<td>1999</td>
</tr>
<tr>
<td>2</td>
<td>Kosko,B</td>
<td>Neural Networks And Fuzzy Systems</td>
<td>Prentice-Hall of India Pvt.Ltd</td>
<td>1994</td>
</tr>
<tr>
<td>3</td>
<td>Klir G.J. and Folger T.A</td>
<td>Fuzzy sets, uncertainty and Information</td>
<td>Prentice-Hall of India Pvt. Ltd.,</td>
<td>1993</td>
</tr>
<tr>
<td></td>
<td>Author(s)</td>
<td>Title</td>
<td>Publisher</td>
<td>Year</td>
</tr>
<tr>
<td>---</td>
<td>-----------------</td>
<td>--------------------------------------</td>
<td>------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>5</td>
<td>Driankov, Hellendroon</td>
<td>Introduction to Fuzzy Control</td>
<td>Narosa Publishers</td>
<td>1998</td>
</tr>
</tbody>
</table>
CRYPTOGRAPHY AND NETWORK SECURITY

OBJECTIVE:
1. To expose the students to the fundamentals of data security.
2. To teach the fundamentals of mathematical aspects in creating Encryption keys
3. To teach the fundamentals of Security in data communication.

OUTCOMES:
1. To understand the fundamentals of Secured system operation.
2. To know the fundamentals of Security in wireless communication.

UNIT - I  SYMMETRIC CIPHERS

UNIT - II  PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS

UNIT - III  NETWORK SECURITY PRACTICE

UNIT - IV  SYSTEM SECURITY

UNIT - V  WIRELESS SECURITY

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Bruce Schneier</td>
<td>Applied Cryptography</td>
<td>John Wiley and Sons Inc</td>
<td>2001</td>
</tr>
<tr>
<td>4</td>
<td>Charles P. Pfleeger,</td>
<td>Security In Computing</td>
<td>Pearson Education</td>
<td>2003</td>
</tr>
<tr>
<td></td>
<td>Shari Lawrence Pfleeger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Mai</td>
<td>Modern Cryptography: Theory and Practice</td>
<td>Pearson Education</td>
<td>2003</td>
</tr>
</tbody>
</table>
OBJECTIVE:
1. To teach the architecture of 8 bit RISC processor.
2. To teach the architecture and programming of 16 bit RISC processor.
3. To teach the implementation of DSP in ARM processor.

OUTCOMES:
1. To know on memory management in RISC processor.
2. To understand the application development with ARM processor.

UNIT I AVR MICROCONTROLLER ARCHITECTURE

UNIT II PERIPHERAL OF AVR MICROCONTROLLER

UNIT III ARM ARCHITECTURE AND PROGRAMMING

UNIT IV ARM APPLICATION DEVELOPMENT

UNIT V DESIGN WITH ARM MICROCONTROLLERS

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Steve Furber</td>
<td>ARM system on chip architecture</td>
<td>Addison Wesley</td>
<td>2003</td>
</tr>
<tr>
<td>2</td>
<td>Andrew N. Sloss, Dominic Symes, Chris Wright, John Rayfield</td>
<td>ARM System Developer’s Guide Designing and Optimizing System Software</td>
<td>Elsevier</td>
<td>2007</td>
</tr>
<tr>
<td>3</td>
<td>Trevor Martin</td>
<td>The Insider's Guide to the Philips ARM7-Based Microcontrollers, An Engineer's Introduction to the LPC2100 Series</td>
<td>Hitex (UK) Ltd</td>
<td>2001</td>
</tr>
<tr>
<td></td>
<td>Dananjay V. Gadre</td>
<td>Programming and Customizing the AVR microcontroller</td>
<td>McGraw Hill.</td>
<td>2001</td>
</tr>
</tbody>
</table>
OBJECTIVES:
1. To expose the students to the fundamentals of microprocessor architecture.
2. To introduce the advanced features in microprocessors and microcontrollers.
3. To enable the students to understand various microcontroller architectures.

OUTCOMES:
1. The student will be able to work with suitable microprocessor / microcontroller for a specific real world application.

UNIT – I MICROPROCESSOR ARCHITECTURE

UNIT – II HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM

UNIT – III HIGH PERFORMANCE RISC ARCHITECTURE : ARM

UNIT – IV MOTOROLA 68HC11 MICROCONTROLLERS

UNIT – V PIC MICRO CONTROLLER
CPU architecture – Instruction set – Interrupts – Timers – I/O port expansion – I2C bus for peripheral chip access – A/D converter – UART

REFERENCES

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Author(s) Name</th>
<th>Title of the book</th>
<th>Publisher</th>
<th>Year of publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>James L. Antonakos</td>
<td>The Pentium Microprocessor</td>
<td>The Pentium Microprocessor</td>
<td>1997</td>
</tr>
<tr>
<td>3</td>
<td>Steve Furber</td>
<td>ARM System –On – Chip architecture</td>
<td>Addison Wesley, Boston.</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Book Title</td>
<td>Publisher</td>
<td>Year</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------</td>
<td>------------------------------------------------------</td>
<td>-------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>5</td>
<td>James L. Antonakos</td>
<td>An Introduction to the Intel family of Microprocessors</td>
<td>Pearson Education, New Delhi.</td>
<td>1999</td>
</tr>
</tbody>
</table>
VALUE ADDED COURSES

15MEVA*51   MATLAB PROGRAMMING   2 0 0 2 100

UNIT - I  INTRODUCTION TO MATLAB

UNIT – II SIGNAL AND IMAGE PROCESSING TOOLBOX FUNCTION
Signal-Key Features - Generating, Visualizing, and Analyzing Signals- Performing Spectral Analysis in MATLAB - Designing Digital FIR and IIR Filters - Developing Signal Processing Algorithms Image-Basic functions- Read and Display an Image- Check the Image Storage Information- Pixel Value & Euclidean Distance- Image Processing- Multiple-Image Display- Write the Image- Image Properties- Histogram- Negative- Frequency Domain- Fourier Transform- Convolution Filters
UNIT - I  INTRODUCTION TO EMBEDDED SYSTEM

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection & tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT 2: PROGRAMMING CONCEPTS AND EMBEDDED PROGRAMMING IN C, C++

PART I  STAGES IN WRITING ARTICLES
Original research topic – novel approach to problems – concentrating on one or two fields – generating one or two papers from projects/thesis – critical thinking – working abstracts – eye-catching title - splitting different ideas in different papers – keeping it brief – depth in the approach - main assumptions and results - importance of introduction and conclusion – making the content interesting – no plagiarism – mentioning important references – preparing a blue print - definition of symbols used – source citations acknowledgements – confidentiality of the articles.

PART II  JOURNAL PUBLICATION
Understanding research ethics and academic integrity – motivation to publish – difference in the approach between conference publishing and publishing in articles – search current journals – e-journals – finding the most appropriate journals - peer review process – difference between the ISBN & ISSN – the impact factor – formatting as required by journals – rankings for sole author
/co-author(s) - cover page – cover letter – rejection and revision – responding to comments from referees – resubmission – quality not quantity