JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANANTHAPURAMU (A.P.)
COURSE STRUCTURE AND SYLLABUS
(For Affiliated Engineering Colleges w.e.f. 2017-18 Admitted Batch)
M.Tech-ECE-Embedded Systems (ES)

M.Tech I Semester

S.No	Subject Code	Subject	L	T	P	C
1.	17D06201	Embedded System Design	4	-	-	4
2.	17D06203	Linux Programming and OOPs	4	-	-	4
3.	17D55101	Embedded C	4	-	-	4
4.	17D06204	Sensors and Actuators	4	-		4
5.	17D06101 17D06103 17D55102	**Elective-I** a. Structural Digital System Design b. Advanced Computer Architecture c. Real Time Operating Systems	3	-	-	3
6.	17D06202 17D38201 17D06208	**Elective-II** a. CPLD and FPGA Architectures and Applications b. Wireless Communications and Networks c. Network Security and Cryptography	3	-	-	3
7.	17D38208	Embedded System Design Lab	-	-	3	2
8.	17D06211	Linux Programming and OOPs Lab	-	-	3	2
		Total	**22**	**-**	**06**	**26**

M.Tech II Semester

S.No	Subject Code	Subject	L	T	P	C
1.	17D38202	Internet of Things	4	-	-	4
2.	17D55201	System on Chip Architecture	4	-	-	4
3.	17D55202	Embedded Networking	4	-	-	4
4.	17D55203	ARM Based Embedded System Design	4	-		4
5.	17D55204 17D06209 17D55205	**Elective-III** a. Hardware and Software Co-design of Embedded System b. Digital Image and Video Processing c. Soft Computing Techniques	3	-	-	3
6.	17D06205 17D06206 17D55206	**Elective-IV** a. Internet Protocols b. MEMS and its Applications c. ASIC Design	3	-	-	3
7.	17D55207	ARM Based Embedded System Design Lab	-	-	3	2
8.	17D55208	Internet of Things Lab	-	-	3	2
		Total	**22**	**-**	**06**	**26**

M.Tech. II YEAR (III Semester)

S. No	Course Code	Subject	L	T	P	C
1.	17D20301 17D20302 17D20303	Elective – V (Open Elective) 1. Research Methodology 2. Human Values & Professional Ethics 3. Intellectual Property Rights	4	---	---	4
2.	17D55201	ELECTIVE – VI (MOOCs)	--	---	---	--
3.	17D55202	Comprehensive Viva Voce	--	---	---	2
4.	17D55203	Seminar	--	---	---	2
5.	17D55204	Teaching Assignment	--	---	---	2
6.	17D55205	Project Work Phase I	--	---	---	4
		Total	4			14

M.Tech. II YEAR (IV Semester)

S. No	**Course Code**	**Subject**	**L**	**T**	**P**	**C**
1.	17D55401	Project Work Phase II	--	---	---	12
		Total				**12**

Project Viva Voce Grades:

A: Satisfactory

B: Not Satisfactory

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M.Tech I year I Semester (ES)

L	T	P	C
4	0	0	4

(17D06201) EMBEDDED SYSTEM DESIGN

Course Outcomes:

After completion of this course the students will be able to understand

- The issues relating to hardware and software design concepts associated with processor in Embedded Systems.
- The concept of low power microcontrollers.
- The hardware software co- design issues pertaining to design of an Embedded System using low power microcontrollers.

UNIT – I

Introduction to Embedded Electronic Systems and Microcontrollers:

An Embedded System-Definition, Embedded System Design and Development Life Cycle, An Introduction to Embedded system Architecture, The Embedded Systems Model, Embedded Hardware: The Embedded Board and the von Neumann Model, Embedded Processors: ISAArchitectureModels, Internal Processor Design, Processor Performance, Board Memory: Read-Only Memory (ROM), Random-Access Memory (RAM), Auxiliary Memory, Memory Management of External Memory and Performance, Approaches to Embedded Systems, Small Microcontrollers, Anatomy of a Typical Small Microcontroller, Small Microcontrollers Memory, Embedded Software, Introduction to small microcontroller (MSP430).

UNIT-II

MSP430 – I:

Architecture of the MSP430 Processor: Central Processing Unit, Addressing Modes, Constant Generator and Emulated Instructions, Instruction Set, Examples, Reflections on the CPU and Instruction Set, Resets, Clock System, Memory and Memory Organization.

Functions, Interrupts, and Low-Power Mode: Functions and Subroutines, Storage for Local Variables, Passing Parameters to a Subroutine and Returning a Result, Mixing C and Assembly Language, Interrupts, Interrupt Service Routines, Issues Associated with Interrupts, Low-Power Modes of Operation.

UNIT – III

MSP430 – II:

Digital Input, Output, and Displays: Parallel Ports, Digital Inputs, Switch Debounce, Digital Outputs, Interface between Systems, Driving Heavier Loads, Liquid Crystal Displays, Simple Applications of the LCD.

Timers: Watchdog Timer, Timer_A, Timer_A Modes, Timer_B,Timer_B Modes, Setting the Real-Time Clock, State Machines.

UNIT – IV

MSP430 Communication:

Communication Peripherals in the MSP430, Serial Peripheral Interface, SPI with the USI, SPI with the USCI, A Thermometer Using SPI Modes, Inter-integrated Circuit Bus(I^2C) and its operations, State Machines for I^2C Communication, A Thermometer Using I^2C, Asynchronous Serial Communication, Asynchronous Communication with the USCI_A, A Software UART Using Timer_A, Other Types of Communication.

UNIT – V

MSP430 Case Studies:

Introduction to Code Composer studio (CC Studio Ver. 6.1) a tutorial, A Study of blinking LED, Enabling LED using Switches, UART Communication, LCD interfacing, Interrupts, Analog to Digital Conversion, General Purpose input and output ports, I2C.

TEXT BOOKS:

1. Tammy Noergaard "Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers", Elsevier(Singapore) Pvt.Ltd.Publications, 2005.
2. John H. Davies "MSP430 Microcontroller Basics",Elsevier Ltd Publications, Copyright 2008.

REFERENCE BOOKS:

1. Manuel Jiménez Rogelio,PalomeraIsidoroCouvertier "Introduction to Embedded SystemsUsing Microcontrollers and the MSP430" Springer Publications, 2014.
2. Frank Vahid, Tony D. Givargis, "Embedded system Design: A Unified Hardware/Software Introduction", John Wily & Sons Inc.2002.
3. Peter Marwedel, "Embedded System Design", Science Publishers, 2007.
4. Arnold S Burger, "Embedded System Design", CMP Books, 2002.
5. Rajkamal, "Embedded Systems: Architecture, Programming and Design", TMH Publications,Second Edition, 2008.

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M.Tech I year I Semester (ES)

L	T	P	C
4	0	0	4

(17D06203) LINUX PROGRAMMING AND OOPS

OBJECTIVES:

- To understand and make effective use of Linux utilities and Shell scripting language (bash) to solve Problems.
- To implement in C some standard Linux utilities such as ls, mv, cp etc. using system calls.
- To develop the skills necessary for systems programming including file system programming, process and signal management, and interprocess communication.
- To get a clear understanding of object-oriented concepts.
- To understand object oriented programming through C++

Course Outcomes:

After completion of the course students able to

- Know the importance of Linux towards design of embedded systems
- Creation of programs in the Linux environment
- Understand the concepts of classes, polymorphism and inheritance

Unit -I: Linux Basics: Introduction to Linux, File System of the Linux, General usage of Linux kernel 7 basic commands, Linux users and group, Permissions for file, directory and users, Searching a file & directory, Zipping and unzipping concepts, Editors and Utilities. Memory Management Policies: Swapping – Demand paging.

Unit - II: Linux Utilities-File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities and Backup utilities. Sed-Scripts, Operation, Addresses, Commands, awk-Execution, Fields and Records, Scripts, Operation, Patterns, Actions, Associative Arrays, String and Mathematical functions, System commands in awk, Applications.

Unit - III: Shell programming with Bourne again shell(bash)- Introduction, shell responsibilities, pipes and Redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

Unit - IV: Introduction to Object Oriented Programming: Need for Object Oriented Programming - Characteristics of Object Oriented Languages – Comparison of C and C++ - Structures: Structures - Enumerations – Functions: Simple Functions – Passing Arguments to Functions – Returning Values from Functions – Reference Arguments - Overloaded Functions – Recursion – Inline Functions – Default Arguments – Scope and Storage Class – Returning by Reference – const Function Arguments.

Unit - V: Objects and Classes: A Simple Class – C++ Objects as Physical Objects – C++ Objects as Data Types - Constructors – Objects as Function Arguments - Copy Constructor – Structures and Classes – Classes, Objects and Memory - Static class data – Constant Member functions and constant objects - Arrays and Strings: Array Fundamentals – Arrays as Class Member Data – Array of Objects – C-Strings – The Standard C++ String Class.

TEXT BOOKS:

1. Unix System Programming using C++, T. Chan, PHI

2. Robert Lafore, Object Oriented Programming In C++, Fourth Edition, Tech Media, 2002. ISBN 0-672-32308-7

REFERENCE BOOKS: -

1. Beginning Linux Programming, 4th Edition, N. Mathew, R. Stones, Wrox, Wiley India Edition.
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH
3. Stanley B. Lippman, JoseeLajoie, C++ Prime, Third Edition, Pearson Education.
4. BjarneStroustrup, Programming: Principles and Practice Using C+, Addison Wesley, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I year I Semester (ES)

L	T	P	C
4	0	0	4

(17D55101) EMBEDDED C

Course Outcomes

After completion of the course students able to

- Know about programming concepts in embedded system design
- Understand features and concepts of embedded programming languages and
- Able describe how microcontroller based embedded systems are programmed and implemented in real time applications.
- Write simple programs and implement the same embedded hardware.

UNIT – I

Programming Embedded Systems in C Introduction ,What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software, Conclusions Introducing the 8051 Microcontroller Family Introduction, What's in a name, The external interface of the Standard 8051, Reset requirements ,Clock frequency and performance, Memory issues, I/O pins, Timers, Interrupts, Serial interface, Power consumption ,Conclusions

UNIT – II

Reading Switches Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version), The need for pull-up resistors, Dealing with switch bounce, Example: Reading switch inputs (basic code), Example: Counting goats, Conclusions

UNIT – III

Adding Structure to the Code Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the 'Hello Embedded World' example, Example: Restructuring the goat-counting example, Further examples, Conclusions

UNIT – IV

Meeting Real-Time Constraints Introduction, Creating 'hardware delays' using Timer 0 and Timer 1, Example: Generating a precise 50 ms delay, Example: Creating a portable hardware delay, Why not use Timer 2, The need for 'timeout' mechanisms, Creating loop timeouts, Example: Testing loop timeouts, Example: A more reliable switch interface, Creating hardware timeouts, Example: Testing a hardware timeout, Conclusions

UNIT – V

Compilation and linking, Compiling and Linking Multiple Source Files, Compiling Multifile Programs, Linking Multifile Programs, Using #include, External VariablesUsing an Object Library Manager Using MAKE Files.

Case Study: Intruder Alarm System Introduction, The software architecture, Key software components used in this example, running the program, the software, Conclusions

TEXT BOOKS

1. Embedded C - Michael J. Pont, 2nd Ed., Pearson Education, 2008

2. Advanced C - Peter D. Hipson, Sams Publishing, USA, 1992

REFERENCE BOOKS

1. PICmicro MCU C-An introduction to programming, The Microchip PIC in CCS C - Nigel Gardner

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M.Tech I year I Semester (ES)	L	T	P	C
	4	0	0	4

(17D06204) SENSORS AND ACTUATORS

Course Outcomes:

- Able to learn about sensor Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), and Characterization.
- Able to know about different sensors like Thermal sensors, Magnetic sensors.
- Able to know about Smart Sensors, Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing, Data Communication, Standards for SmartSensor Interface and the Automation

UNIT -I:

Sensors / Transducers:

Principles – Classification – Parameters – Characteristics - Environmental Parameters (EP) – Characterization Mechanical and Electromechanical Sensors: Introduction – Resistive Potentiometer – Strain Gauge – Resistance Strain Gauge – Semiconductor Strain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor –Types-Capacitive Sensors:– Electrostatic Transducer– Force/Stress Sensors Using Quartz Resonators – Ultrasonic Sensors

UNIT –II

Thermal Sensors:

Introduction – Gas thermometric Sensors – Thermal Expansion Type Thermometric Sensors – Acoustic Temperature Sensor – Dielectric Constant and Refractive Index thermosensors – Helium Low Temperature Thermometer – Nuclear Thermometer – Magnetic Thermometer – Resistance Change Type Thermometric Sensors –Thermoemf Sensors– Junction Semiconductor Types– Thermal Radiation Sensors –Quartz Crystal Thermoelectric Sensors – NQR Thermometry – Spectroscopic Thermometry – Noise Thermometry – Heat Flux Sensors Magnetic sensors: Introduction – Sensors and the Principles Behind – Magneto-resistive Sensors – Anisotropic Magnetoresistive Sensing – Semiconductor Magnetoresistors– Hall Effect and Sensors – Inductance and Eddy Current Sensors– Angular/Rotary Movement Transducers – Synchros – Synchro-resolvers - Eddy Current Sensors – Electromagnetic Flowmeter – Switching Magnetic Sensors SQUID Sensors

UNIT -III

Radiation Sensors:

Introduction – Basic Characteristics – Types of Photosensistors/Photo detectors– X-ray and Nuclear Radiation Sensors– Fiber Optic Sensors Electro analytical Sensors: Introduction – The Electrochemical Cell – The Cell Potential - Standard Hydrogen Electrode (SHE) – Liquid Junction and Other Potentials – Polarization – Concentration Polarization-– Reference Electrodes - Sensor Electrodes – Electro ceramics in Gas Media.

UNIT –IV

Smart Sensors:

Introduction – Primary Sensors – Excitation – Amplification – Filters – Converters – Compensation– Information Coding/Processing - Data Communication – Standards for Smart Sensor Interface – The Automation Sensors –Applications: Introduction – On-board Automobile Sensors (Automotive Sensors)– Home Appliance Sensors – Aerospace Sensors — Sensors for Manufacturing –Sensors for environmental Monitoring

UNIT -V:

Actuators:

Pneumatic and Hydraulic Actuation Systems- Actuation systems – Pneumatic and hydraulic systems - Directional Control valves – Presure control valves – Cylinders - Servo and proportional control valves – Process control valves – Rotary actuators Mechanical Actuation Systems- Types of motion – Kinematic chains – Cams – Gears – Ratchet and pawl – Belt and chain drives – Bearings – Mechanical aspects of motor selection Electrical Actuation Systems-Electrical systems -Mechanical switches – Solid-state switches Solenoids – D.C. Motors – A.C. motors – Stepper motors

TEXT BOOKS

1. D. Patranabis – "Sensors and Transducers" –PHI Learning Private Limited.
2. W. Bolton – "Mechatronics" –Pearson Education Limited.

REFERENCE BOOKS

1. Sensors and Actuators – D. Patranabis – 2nd Ed., PHI, 2013

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M.Tech I year I Semester (ES)

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3	0	0	3

(17D06101) STRUCTURED DIGITAL SYSTEM DESIGN
Elective-I

Course Objective:

- To study about structural functionality of different Digital blocks (Both combinational and Sequential)
- To provide an exposure to ASM charts, their notations and their realizations.
- To provide an exposure to VHDL and different styles of modeling using VHDL.
- To introduce concept of micro programming and study issues related to micro programming

Course Outcome:

After Completion of this course students will be able to

- Understand structural functionality of different digital blocks
- Represent and Realize their designs in ASM charts
- Represent their designs in different modelling styles by using VHDL
- Understand concept of Micro program and issues related to micro programming

UNIT-1

BUILDING BLOCKS FOR DIGITAL DESIGN: Multiplexer, Demultiplexer, Decoder, Encoder, Comparator, Adder, ALU, Carry-look-ahead adder.

BUILDING BLOCKS WITH MEMORY: Clocked building blocks, register building blocks, RAM, ROM, PLA, PAL, Timing devices.

UNIT -II

DESIGN METHODS: Elements of design style, top-down design, separation of controller and architecture, refining architecture, and control algorithm, Algorithmic State Machines, ASM chart notations.

UNIT-III

REALISING ASMS - Traditional synthesis from ASM chart, multiplexer controller method, one-shot method, ROM based method.

ASYNCHRONOUS INPUTS AND RACES - Asynchronous ASMs, Design for testability, test vectors, fault analysis tools.

UNIT-IV

MICROPROGRAMED DESIGN: Classical Microprogramming with Modem Technology; Enhancing the Control Unit; The 2910 Microprogram Sequencer; Choosing a Microprogram Memory; A Development System for Microprogramming; Designing a Microprogrammed Minicomputer

UNIT-V

MODELLING WITH VHDL: CAD tools, simulators, schematic entry, synthesis from VHDL.

DESIGN CASE STUDIES: Single pulse, system clock, serial to parallel data conversion, traffic light controller.

TEXT BOOKS:

1. Franklin P. Prosser and David E. Winkel, "The Art of Digital Design", Prentice Hall.
2. Roth, “Digital System Design using VHDL”, Mc. Graw Hill, 2000

REFERENCE BOOKS:

1. William Fletcher, An Engineering Approach to Digital Design, 1st Edition, Prentice-Hall India, 1997.
2. William J Dally and John W Poulton, Digital Systems Engineering, Cambridge University Press, 2008.
3. Jayaram Bhasker, A VHDL Primer, 3rd edition, Prentice-Hall India, 2009.
4. VHDL for Programmable Logic - Kevin Skahill, Cypress Semiconductors

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M.Tech I year I Semester (ES)

L	T	P	C
3	0	0	3

(17D06103) ADVANCED COMPUTER ARCHITECTURE
Elective-I

Course Outcomes:

After completion of the course the students will be able to

- Know about different parallel computer models and their network properties.
- Understand about different concepts related to pipelining and super scalar techniques.
- Get complete knowledge regarding multi processors and multi computers.

UNIT - I

Parallel Computer Models – System attributes to performance, Multiprocessors and Multicomputers, Classifications of Architectures, Multivector and SIMD Computers, Architecture development tracks

UNIT - II

Program and Network Properties- Conditions for parallelism, Program partitioning and Scheduling, Program flow mechanisms, System interconnect architectures, Performance metrics and measures, Parallel Processing Applications

UNIT-III

Processors and Memory Hierarchy- Advanced Processor Technology, Superscalar and Vector processors, Memory hierarchy technology, Virtual Memory, Backplane bus systems, Cache memory organizations, Shared memory organizations

UNIT - IV

Pipelining and Superscalar Techniques Linear Pipeline processors, Nonlinear pipeline processors, Instruction pipeline design, Arithmetic pipeline design, Superscalar and Super Pipeline Design

UNIT- V

Multiprocessors and Multicomputers Multiprocessor System Interconnects, Cache Coherence and Synchronization mechanisms, Three generations of Multicomputers, Message passing mechanisms, Vector Processing principles, Principles of Multithreading

TEXT BOOKS:

1. Hwang kai, "Advanced Computer Architecture", McGraw-Hill, 2001.
2. Patterson, David and Hennessy John**,** Morgn Kaufmann, "Computer Architecture",2001.

REFERENCE BOOKS:

1. William Stallings, Computer Organization and Architecture, 8th Edition, Prentice-Hall India, 2010.
2. David A Patterson and John L. Hennesey, Computer Organization and Design, 4th Edition, Elsevier India, 2011.
3. Andrew S Tanenbaum and James R Goodman, Structured Computer Organization, 5th Edition PrenticeHall India, 2009.

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M.Tech I year I Semester (ES)	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

(17D55102) REAL TIME OPERATING SYSTEMS
Elective-I

Course Outcomes

After completion of the course students able to

- Know about the fundamentals of operating systems and their importance in real time applications
- Able describe how a real-time operating system designed and their importance in embedded system design.
- Explain how the real-time operating system implemented with their architectural features.
- Design simple embedded systems in RTOS environment.

UNIT – I

Operating System Introduction: Operating Systems Objectives and functions, Computer System Architecture, OS Structure, OS Operations, Evolution of Operating Systems – Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special – Purpose Systems, Operating System services, user OS Interface, System Calls, Types of System Calls, System Programs, Opening System Design and Implementation, OS Structure, Virtual machines.

UNIT – II

Process and CPU Scheduling – Process concepts – The Process, Process State, Process Control Block, Threads, Process Scheduling – Scheduling Queues, Schedulers, Context Switch, Pre emptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Thread scheduling, Process Coordination – Process Synchronization, The Critical section Problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Memory Management and Virtual Memory and File System Interface.

UNIT – III

Real Time Operating Systems, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use, Objects, Services and I/O Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

UNIT – IV

Exceptions, Interrupts and Timers Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

UNIT – V

Case Studies of RTOS RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS.

TEXT BOOKS

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
2. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

REFERENCE BOOKS

1. Operating systems – Internals and Design Principles, W. Stallings, 6th Edition, Pearson.
2. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH. 2. Advanced Programming, Richard Stevens
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

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M.Tech I year I Semester (ES)

L	T	P	C
3	0	0	3

(17D06202) CPLD AND FPGA ARCHITECTURES AND APPLICATIONS

Elective-II

Course Outcomes:

After completion of the course students able to

- Understand the features and architectures of industrial CPLDs with different families.
- Understand the features and architectures of industrial FPGAs with different families.
- Know the programming techniques used in FPGA design methodology.
- Design and implement complex real time digital circuits.

UNIT-I

Introduction to Programmable Logic Devices: Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II

Field Programmable Gate Arrays: Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, and Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.

UNIT –III

SRAM Programmable FPGAs: Introduction, Programming Technology, Device Architecture, the Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT –IV

Anti-Fuse Programmed FPGAs: Introduction, Programming Technology, Device Architecture, TheActel ACT1, ACT2 and ACT3 Architectures.

UNIT –V

Design Applications: General Design Issues, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

TEXT BOOKS

1. Field Programmable Gate Array Technology - Stephen M. Trimberger, Springer International Edition.
2. Digital Systems Design - Charles H. Roth Jr, LizyKurian John, Cengage Learning.

REFERENCE BOOKS

1. Field Programmable Gate Arrays - John V. Oldfield, Richard C. Dorf, Wiley India.
2. Digital Design Using Field Programmable Gate Arrays - Pak K. Chan/SamihaMourad, Pearson Low Price Edition.
3. Digital Systems Design with FPGAs and CPLDs - Ian Grout, Elsevier, Newnes.
4. FPGA based System Design - Wayne Wolf, Prentice Hall Modern Semiconductor Design Series.

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M.Tech I year I Semester (ES)

L	T	P	C
3	0	0	3

(17D38201) WIRELESS COMMUNICATIONS AND NETWORKS

Elective-II

Course Outcomes

After completion of the course students able to

- Understand concepts of wireless communication systems and their applications.
- Know about the mobile radio propagation techniques and detailed understanding in wireless mobile communication.
- Understand communication networks and detailed analysis of wireless communications networks.
- Understand the different protocols used for wireless communication systems and networks.

UNIT –I The Cellular Concept-System Design Fundamentals:

Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring .

UNIT –II Mobile Radio Propagation:

Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- LongleyRyce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT –III Mobile Radio Propagation:

Small –Scale Fading and Multipath: Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT –IV Equalization and Diversity:

Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement, Derivation of Maximal Ratio

Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT –V Wireless Networks:
Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11,IEEE 802.11 Medium Access Control, Comparision of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

TEXT BOOKS

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
3. Mobile Cellular Communication – GottapuSasibhushanaRao, Pearson Education, 2012.

REFERENCE BOOKS

1. Principles of Wireless Networks – KavehPahLaven and P. Krishna Murthy, 2002, PE
2. Wireless Digital Communications – KamiloFeher, 1999, PHI.
3. Wireless Communication and Networking – William Stallings, 2003, PHI.

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M.Tech I year I Semester (ES)

L	T	P	C
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(17D06208) NETWORK SECURITY AND CRYPTOGRAPHY

Elective-II

Course Outcomes:

After completion of this course students will be able to know

- The need and role of security and cryptography in computer networks.
- Gain knowledge about different techniques associated with encryption.
- Functioning of different algorithms associated with computer networks.
- Gain knowledge regarding different security architecture and designing issues related to fire walls.

UNIT – I

Introduction: Attacks, services and mechanisms, security attacks, security services, a model for internet work security, protection through cryptography, the role of cryptography in network security.

UNIT – II

Conventional Encryption: Substitution techniques and transposition techniques, block cipher principles, block cipher design principles, block cipher modes of operation. The data encryption standard

UNIT – III

Public-key encryption: Principles of public-key cryptosystems, the RSA algorithm, key management. Authentication requirements, authentication functions, message authentication codes, hash functions.

UNIT – IV

Digital Signatures and Authentication Protocols: Digital signatures, Digital signature standard, Authentication Protocols, MD5, message digest algorithm, secure hash algorithm, HMAC.

UNIT – V

Mall security & IP security: Pretty good privacy, IP security overview, IP security architecture, Intruders, viruses and related threats, firewall design principles

TEXT BOOKS:

1. W. Stallings**, "**Cryptography & Network Security", 3/e, PHI, 2003
2. Eric Maiwald**, "**Fundamental of Network Security", Dreamtech press Osborne MGH, 2004

REFERENCE BOOKS:

1. Sean Convery, " Network Security Architectures, Published by Cisco Press, First Ed. 2004.
2. AtulKahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.
3. Bruce Schneier, "Applied Cryptography", John Wiley and Sons Inc, 2001.
4. Stewart S. Miller, "Wi-Fi Security", McGraw Hill, 2003.
5. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security In Computing", 3rd Edition, Pearson Education, 2003.
6. Jeff Crume, "Inside Internet Security" Addison Wesley, 2005.

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M.Tech I year I Semester (ES)

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(17D38208) EMBEDDED SYSTEM DESIGN LAB

List of Experiments

PART – A

Using Embedded C

Note: Any 10 Programs form the following

1. Write a simple program to print "hello world"
2. Write a simple program to show a delay.
3. Write a loop application to copy values from P1 to P2
4. Write a c program for counting the no of times that a switch is pressed & released.
5. Illustrate the use of port header file (port M) using an interface consisting of a keypad and liquid crystal display.
6. Write a program to create a portable hardward delay.
7. Write a c program to test loop time outs.
8. Write a c program to test hardware based timeout loops.
9. Develop a simple EOS showing traffic light sequencing.
10. Write a program to display elapsed time over RS-232 link.
11. Write a program to drive SEOS using Timer 0.
12. Develop software for milk pasteurization system.

PART – B

Note. Any 6 Programs from the following (Experiment – 1 is mandatory)

1. A Study of Code Composer Studio (CC Studio Latest Version)
2. Flashing a light by a software delay.
3. Displaying Characters on LCD.
4. Serial Communication using UART.
5. Basic Input and Output using MSP430 UART.
6. Interrupt Handling using MSP430.
7. Analog to Digital Conversion using MSP430.
8. Interfacing external Devices to GPIO Ports

Equipments Required:

1. Computer with latest configurations
2. Code Composer Studio v6.1 (Preferably Latest version)
3. MSP430/ARM based Hardware kits and add-on boards.

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(17D06211) LINUX PROGRAMMING AND OOPS LAB

List of Experiments
PART – A
Linux Programming Lab:
Note: Any 6 Programs form the following

1. Introduction to LINUX Operating System.
2. Installation of LINUX Operating System (Red Hat-5).
3. Study of general purpose utilities commands.
4. Study of user & session management commands.
5. Study of file system navigation commands, text processing tools, and communication commands.
6. Study of VI editor.
7. Study of Shell Script.
8. Execute C & C++ programs in Linux.
9. Installation using RPM/YUM server.
10. Back up using TAR command.

List of Experiments
PART – B
Note: Any 6 Programs form the following

OOPs Programs (Using C++ compiler)

1. Write a C++ program to illustrate the static variable functionality using sum of a Fibonacci series as an example
2. To write a C++ program to demonstrate default arguments with a simple example
3. To write a C++ program to demonstrate the use of constructors and destructors
4. To write a C++ program to illustrate the operator overloading concept using Matrix addition as an example
5. To write a C++ program to illustrate the single inheritance using banking system as an example.
6. To write a C++ program to illustrate hybrid inheritance concept using student database creation as an example.
7. To write a C++ program to illustrate exception handling concept using stack operation as an example
8. To write a C++ program to illustrate exception handling concept using queue operation as an example

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(17D38202) INTERNET OF THINGS

Course Outcomes:
After completion of the course the students will be able to

- Able to understand the application areas of IOT
- Able to realize the revolution of Internet in Mobile Devices, Cloud &SensorNetworks
- Able to understand building blocks of Internet of Things and characteristics.

Unit I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT,Logical Design of IOT, IOT Enabling Technologies, IOT Levels.

Unit II
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics,Agriculture, Industry, Health & Life Style.

Unit III
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Unit IV
Developing Internet of Things & Logical Design using Python: Introduction, IOT DesignMethodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, PythonPackages.

Unit V
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board,Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:

1. VijayMadisetti, ArshdeepBahga," Internet of Things A Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:

1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN: 978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN 0989973700

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(17D55201) SYSTEM ON CHIP ARCHITECTURE

Course Outcomes:

After completion of this course the students will be able to

- Get complete basics related to SoC architecture and different approaches related to SoC Design.
- Able to select an appropriated robust processor for SoC Design
- Able to Select an appropriate memory for SoC Design.
- Design SoC
- Realize real time case studies

UNIT I:

Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT II:

Processors: Introduction, Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT III:

Memory Design for SOC: Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT IV:

Interconnect Customization and Configuration: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses , Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT V:

Application Studies / Case Studies: SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

TEXT BOOKS:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, WielyIndiaPvt. Ltd.
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.

REFERENCE BOOKS:

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.
3. System on Chip Verification – Methodologies and Techniques –PrakashRashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers

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(17D55202) EMBEDDED NETWORKING

Course Outcomes:

- Able to understand the basic working modes of networks and its formatted data frames, its control
- Able to understand the significance of embedded networks in real time applications and to use it for specific applications.
- Able to Know different types of communication protocols like serial and parallel communication protocols
- Able to know different types of communication protocols which have embedded end modules
- Able to understand wired and wireless communication protocols, its formats
- Able to understand and gain knowledge on wireless sensors and its application in wireless embedded networks

UNIT –I

Embedded Communication Protocols:

Embedded Networking: Introduction – Serial/Parallel Communication – Serial communication protocols - RS232 standard – RS485 – Synchronous Serial Protocols -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) – PC Parallel port programming - ISA/PCI Bus protocols – Firewire.

UNIT –II

USB and CAN Bus:

USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC 18 Microcontroller USB Interface – C Programs –CAN Bus – Introduction - Frames –Bit stuffing –Types of errors –Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN.

UNIT –III

Ethernet Basics:

Elements of a network – Inside Ethernet – Building a Network: Hardware options – Cables, Connections and network speed – Design choices: Selecting components –Ethernet Controllers – Using the internet in local and internet communications – Inside the Internet protocol.

UNIT –IV

Embedded Ethernet:

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.

UNIT –V

Wireless Embedded Networking:

Wireless sensor networks – Introduction – Applications – Network Topology – Localization –Time Synchronization - Energy efficient MAC protocols –SMAC – Energy efficient and robust routing – Data Centric routing.

TEXT BOOKS

1. Embedded Systems Design: A Unified Hardware/Software Introduction - Frank Vahid, Tony Givargis, John & Wiley Publications, 2002
2. Parallel Port Complete: Programming, interfacing and using the PCs parallel printer port - Jan Axelson, Penram Publications, 1996.

REFERENCE BOOKS:

1. Advanced PIC microcontroller projects in C: from USB to RTOS with the PIC18F series - Dogan Ibrahim, Elsevier 2008.
2. Embedded Ethernet and Internet Complete - Jan Axelson, Penram publications, 2003.
3. Networking Wireless Sensors –BhaskarKrishnamachari, Cambridge press 2005.

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(17D55203) ARM BASED EMBEDDED SYSTEM DESIGN

Course Objective:

- To get knowledge in system design using Micro controllers
- To Study the architectural features and and programming aspects of ARM controllers/processors.
- To learn about memory management in the system design applications

Course Outcome:

After completion of this course students will be able to

- Gets complete knowledge about the system design concepts using Micro controllers.
- Understand thoroughly the architectural and programming concepts of ARM controllers.
- Know about the memory management concepts in system design

UNIT – I

ARM Embedded Systems:

An Embedded System-Definition, Embedded System Design and Development, Life Cycle, Embedded system Architecture, Embedded Systems classification, The RISC Design Philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software, ARM processor Families, Core extensions, Architecture Revisions.

UNIT-II: ARM Programming Model-I

Instruction Set: Data Processing Instructions, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

UNIT-III: ARM Programming Model-II

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

UNIT-IV : ARM Programming

Simple C Programs usingFunction Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, ConditionalExecution and Loops.

UNIT-V: Memory Management

Cache Architecture, Polices, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Content Switch.

TEXT BOOKS:

1. Andrew N. Sloss, Dominic Symes, Chris Wright, “ARM Systems Developer’s Guide- Designing & Optimizing System Software”, 2008, Elsevier.
2. Jonathan W. Valvano – Brookes / Cole, 1999, “Embedded Microcomputer Systems, Real Time Interfacing”, Thomas Learning.

REFERENCE BOOKS:

1. Intel and ARM Data Books on Microcontrollers.
2. Embedded System Design-Frank Vahid/Tony Givargis, John Willey, 2005.
3. Microcontroller (Theory and Applications) Ajay V Deshmukh, Tata McGraw-Hill, 2005.
4. An Embedded Software Primer-David E.Simon, Pearson Education, 1999.

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(17D55204) HARDWARE SOFTWARE CO-DESIGN OF EMBEDDED SYSTEM
Elective-III

Course outcomes:
After completion of this course the students will be able to

- Analyze and apply design methodologies.
- Appreciate the fundamental building blocks of the using hardware and software co-design and related implementation and testing environments and techniques and their interrelationships.
- Get familiar with modern hardware/software tools for building prototypes and to be able to demonstrate practical competence in these areas

UNIT I NATURE OF HARDWARE AND SOFTWARE
Hardware, Software, Definition of Hardware/Software Co-Design – Driving factors Platform design space – Application mapping – Dualism of Hardware design and software design – Concurrency and parallelism, Data flow modeling and Transformation – Data Flow Graph – Tokens, actors and queues, Firing rates, firing rules and Schedules – Synchronous data flow graph – control flow modeling – Adding time and resources – Transformations.

UNIT II DATA FLOW IMPLEMENTATION IN SOFTWARE AND HARDWARE
Software Implementation of Data Flow – Converting queues and actors into software, Dynamic Scheduler – Hardware Implementation of Data Flow – single rate SDF graphs into hardware, Pipelining – Analysis of control flow and data flow – construction of control and data flow graph – Translating C into hardware – Designing data path and controller.

UNIT III DESIGN SPACE OF CUSTOM ARCHITECTURES
Finite state machines with datapath – FSMD design example, Limitations – Microprogrammed Architecture – Microprogrammed control, microinstruction encoding, Microprogrammed data path, microprogrammed machine – General purpose Embedded Core – RISC pipeline, Program organization – SoC interfaces for custom hardware – Design Principles in SoC Architecture

UNIT IV HARDWARE/ SOFTWARE INTERFACES
Principles of Hardware/software communication – synchronization schemes, communication constrained versus Computation constrained, Tight and Loose coupling - On-chip buses – Memory mapped interfaces – coprocessor interfaces – custom instruction interfaces – Coprocessor hardware interface – Data and control design, programmer"s model.

UNIT V CASE STUDIES TriviumCripto coprocessor – Trivium stream cipher algorithm, Trivium for 8-bit platforms – AES coprocessor, CORDIC coprocessor – algorithm and implementation.

TEXT BOOKS:

1. Ralf Niemann, "Hardware/Software Co-Design for Data Flow Dominated Embedded Systems", Kluwer Academic Pub, 1998.
2. Jorgen Staunstrup, Wayne Wolf, "Hardware/Software Co-Design: Principles and Practice" , Kluwer Academic Pub, 1997.

REFERENCE BOOKS:

1. Giovanni De Micheli, Rolf Ernst Morgon, "Reading in Hardware/Software Co-Design" Kaufmann Publishers, 2001.
2. Patrick Schaumont, A Practical Introduction to Hardware/Software Codesign, 2nd Edition, Springer,2010.

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(17D06209) DIGITAL IMAGE AND VIDEO PROCESSING

Elective-III

Course Outcomes:

After completion of this course the students will be able to

- Designpattern recognition systems.
- Design and implement feature extraction techniques for a given application.
- Design a suitable classifier for a given application.

UNIT-I

IMAGE FUNDAMENTALS AND TRANSFORMS

Image Representation- Sampling and Quantization - Two dimensional DFT- Discrete cosine Transform - Walsh - Hadamard transform - Wavelet transform - Construction of Wavelets-Types of wavelets - principal component analysis.

UNIT -II

PROCESSING AND MODELING OF IMAGES

Pre-processing -Point operations – contrast stretching – Histogram - Histogram equalization - Image segmentation- pixel based, edge based, region based segmentation - Morphological image processing - Edge and texture models - Image registration - Colour Image Processing –

UNIT-III

SPATIAL FEATURE EXTRACTION

Feature selection - Localized feature extraction- Boundary Descriptors - Moments - Texture Descriptors - Co-occurrence features

UNIT-IV

CLASSIFIERS

Kernel based approaches - clustering methods - Maximum Likelihood Estimation- Bayesian approach- Pattern Classification

UNIT-V

VIDEO OBJECT EXTRACTION

Back ground subtraction – Frame difference - Static and dynamic background modeling - optical flow techniques-Handling occlusion- scale and appearance changes - Shadow removal.

TEXT BOOKS:

1..A.Bovik, “Handbook of Image and Video Processing”, 2nd Edition, Academic Press, 2005.
2.. Mark Nixon and Alberto Aguado, “Feature Extraction and Image Processing”, Academic Press, 2008.

REFERENCE BOOKS:

1. A.K.Jain, “Fundamentals of Digital Image Processing”, Prentice-Hall, 2002.
2. R.C.Gonzalez and R.E.Woods, „Digital Image Processing“, Second Edition, Pearson Education, 2002.
3. John C.Russ, “The Image Processing Handbook”, CRC Press, 2007.
4. Richard O. Duda, Peter E. Hart and David G. Stork., “Pattern classification”, Wiley, 2001

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(17D55205) SOFT COMPUTING TECHNIQUES

Elective-III

Course Outcomes:

After completion of this course the students will be able to

- Learn about the Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.
- Know about Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm.
- Learn about 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.

UNIT –I

Introduction:

Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT –II

Artificial Neural Networks:

Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

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, Selforganizing 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 Ant-colony search techniques for solving optimization problems.

UNIT –V

Applications:

GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis of Neural-Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems.

TEXT BOOKS

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. &Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994.
3. Introduction to Fuzzy Control - Driankov, Hellendroon, Narosa Publishers.
4. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi.
5. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International.
6. Artificial Neural Network –Simon Haykin, 2nd Ed., Pearson Education.
7. Introduction Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa,1/e, TMH, New Delhi.

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L	T	P	C
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(17D06205) INTERNET PROTOCOLS

Elective-IV

Course Objectives:

After completion of this course the students will be able to

- Get familiar with the Internetworking concepts, internet addressing and TCP/IP protocol Suite.
- Understand Mobile IP and multicasting & unicasting routing protocols.
- Understand the IP security and the firewalls.

UNIT -I

Internetworking Concepts: Principles of Internetworking, Connectionless Internetworking, Application level Interconnections, Network level Interconnection, Properties of thee Internet, Internet Architecture, Wired LANS, Wireless LANs, Point-to-Point WANs, Switched WANs, Connecting Devices, TCP/IP Protocol Suite.

IP Address: Classful Addressing: Introduction, Classful Addressing, Other Issues, Sub-netting and Super-netting

Classless Addressing: Variable length Blocks, Sub-netting, Address Allocation. Delivery, Forwarding, and Routing of IP Packets: Delivery, Forwarding, Routing, Structure of Router.

ARP and RARP: ARP, ARP Package, RARP.

UNIT -II

Internet Protocol (IP): Datagram, Fragmentation, Options, Checksum, IP V.6.

Transmission Control Protocol (TCP): TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Flow Control, Error Control, Congestion Control, TCP Times.

Stream Control Transmission Protocol (SCTP): SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, Congestion Control.

Mobile IP: Addressing, Agents, Three Phases, Inefficiency in Mobile IP.

Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/ Fast Recovery, Transmission/ Time Out Freezing, Selective Retransmission, Transaction Oriented TCP.

UNIT –III

Unicast Routing Protocols (RIP, OSPF, and BGP): Intra and Inter domain Routing, Distance Vector Routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP.

Multicasting and Multicast Routing Protocols: Unicast - Multicast- Broadcast, Multicast Applications, Multicast Routing, Multicast Link State Routing: MOSPF, Multicast Distance Vector: DVMRP.

UNIT -IV:

Domain Name System (DNS): Name Space, Domain Name Space, Distribution of Name Space, and DNS in the internet.

Remote Login TELNET: Concept, Network Virtual Terminal (NVT).

File Transfer FTP and TFTP: File Transfer Protocol (FTP).

Electronic Mail: SMTP and POP.

Network Management-SNMP: Concept, Management Components, World Wide Web- HTTP Architecture.

UNIT –V

Multimedia: Digitizing Audio and Video, Network security, security in the internet firewalls. Audio and Video Compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real-Time Interactive Audio/ Video, RTP, RTCP, Voice Over IP. Network Security, Security in the Internet, Firewalls.

TEXT BOOKS:

1. TCP/IP Protocol Suite- Behrouz A. Forouzan, Third Edition, TMH
2. Internetworking with TCP/IP Comer 3 rd edition PHI

REFERENCE BOOKS:

1. High performance TCP/IP Networking- Mahbub Hassan, Raj Jain, PHI, 2005
2. Data Communications & Networking – B.A. Forouzan – 2nd Edition – TMH
3. High Speed Networks and Internets- William Stallings, Pearson Education, 2002.
4. Data and Computer Communications, William Stallings, 7th Edition., PEI.
5. The Internet and Its Protocols – AdrinFarrel, Elsevier, 2005.

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(17D06206) MEMS AND ITS APPLICATIONS

Elective-IV

Course Outcomes:

After completion of this course the students will be able to

- Understand concepts of basic MEM devices and systems
- Acquires knowledge on mechanical terms used in MEMS
- Understand the two terminal MEMS and its characteristics.
- Design digital and analog applications in various silicon based MEMS structures.

UNIT - I

Introduction Basic structures of MEM devices – (Canti-Levers, Fixed Beams diaphragms).Broad Response of Micro electromechanical systems (MEMS) to Mechanical (Force, pressure etc.)Thermal, Electrical, optical and magnetic stimuli, compatibility of MEMS from the point of power dissipation, leakage etc.

UNIT - II

Review of mechanical concepts like stress, strain, bending moment, deflection curve. Differential equations describing the deflection under concentrated force, Distributed force, distributed force, Deflection curves for canti-levers- fixed beam. Electrostatic excitation – columbic force between the fixed and moving electrodes.Deflection with voltage in C.L, Deflection Vs Voltage curve, critical fringe field – field calculations using Laplace equation.Discussion on the approximate solutions – Transient response of the MEMS.

UNIT-III

Types Two terminal MEMS - capacitance Vs voltage Curve – Variable capacitor.Applications of variable capacitors.Two terminal MEM structures.Three terminal MEM structures – Controlled variable capacitors – MEM as a switch and possible applications.

UNIT-IV

MEM Circuits & Structures MEM circuits & structures for simple GATES- AND, OR, NAND, NOR, Exclusive OR, simple MEM configurations for flip-flops triggering applications to counters, converters. Applications for analog circuits like frequency converters, wave shaping. RF Switches for modulation. MEM Transducers for pressure, force temperature.Optical MEMS.

UNIT-V

MEM Technologies Silicon based MEMS- Process flow – Brief account of various processes and layers like fixed layer, moving layers spacers etc., and etching technologies. Metal Based MEMS: Thin and thick film technologies for MEMS. Process flow and description of the processes, Status of MEMS in the current electronics scenario.

TEXT BOOKS

1. MEMS Theory, Design and Technology - GABRIEL. M.Review, R.F.,2003, John wiley& Sons. .
2. Strength of Materials –ThimoShenko, 2000, CBS publishers & Distributors.
3. MEMS and NEMS, Systems Devices; and Structures - ServeyE.Lyshevski, 2002, CRC Press.

REFERENCE BOOKS

1. Sensor Technology and Devices - Ristic L. (Ed) , 1994, Artech House, London.

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(17D55206) ASIC DESIGN
Elective-IV

Course Outcomes:
After completion of the course the student will be able to

- Understand different types of ASICs and their libraries.
- Understands about programmable Asics, I/O modules and their interconnects.
- Gets complete knowledge regarding different methods of software ASIC design their simulation, testing and construction of ASICs.

UNIT I
INTRODUCTION TO ASICs:
Types of ASICs, Design Flow, Case Study, Economics of ASICs, ASIC Cell Libraries,Transistors as resistors, Transistor Parasitic Capacitance, Logical Effort, Library Cell Design,Library Architecture, Gate-Array Design, Standard Cell Design, Data Path Cell Design.

UNIT II
PROGRAMABLE ASICS AND PROGRAMABLE ASIC LOGIC CELLS:
The Anti fuse, Static Ram, EPROM and EEPROM Technology, Practical Issues,Specifications, PREDP Benchmarks, FPGA Economics, Actel ACT, Xilinx LCA, AlteraFlex, Altera Max.

UNIT-III
I/O CELLS AND INTERCONNECTS & PROGRAMMABLE ASIC DESIGN SOFTWARE:
DC Output, AC Output, DC input, AC input, Clock input, Power input, Xilinx I/O block,Other I/O Cells, Actel ACT, Xilinx LCA, Xilinx EPLD, Altera Max 5000 and 7000, AlteraMax 9000, Altera FLEX, Design Systems, Logic Synthesis, The Half gate ASIC.

UNIT IV
LOW LEVEL DESIGN ENTRY AND LOGIC SYNTHESIS:
Schematic Entry, Low level Design Languages, PLA Tools, EDIF, A logic synthesisexample, A Comparator/MUX, Inside a Logic Synthesizer, Synthesis of Viterbi Decoder,Verilog and Logic synthesis, VHDL and Logic Synthesis, Finite State Machine Synthesis,MemorySenthesis, The Engine Controller, Performance Driven Synthesis, Optimization oftheviterbi decoder.

UNIT V
SIMULATION, TEST AND ASIC CONSTRUCTION:
Types of Simulation, The Comparator/MUX Example, Logic Systems, How LogicSimulation Works, Cell Models, Delay Models, Static Timing Analysis, Formal Verification,Switch Level Simulation, Transistor Level Simulation, The importance of test, BoundaryScan Test, Faults, Faults Simulation, Automatic Test Pattern Generator, Scan Test, Built in Self Test, A simple test Example, Physical Design, CAD Tools, System Partitioning,Estimating ASIC Size, Power Dissipation, FPGA Partitioning, Partitioning Methods

TEXT BOOKS:

1. Michael John Sebastian Smith, “Application Specific Integrated Circuits”, PearsonEducation, 2003.

REFERENCE BOOKS

1. L.J.Herbst, “Intigrated Circuit Engineering”, Oxford Science Publications, 1996.
2. HimanshuBhatnagar, “Advanced ASIC Chip Synthesis using Synopsis Designcompiler”, 2nd Edition, Kluwer Academic, 2001.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech I year II Semester (ES)

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(17D55207) ARM BASED EMBEDDED SYSTEM DESIGN LAB

Note : 1. The Students are required to write the programs using C-Language according to the Experiment requirements using RTOS Library Functions and macros ARM-926 developer kits and ARM-Cortex.

2. The following experiments are required to develop the algorithms, flow diagrams, source code and perform the compilation, execution and implement the same using necessary hardware kits for verification.

3. The programs developed for the implementation should be at the level of an embedded system design.

4. The students are required to perform at least **SIX** experiments from **Part-I** and **TWO** experiments from **Part-II.**

List of Experiments:

Part-I

Experiments using ARM-926 with PERFECT RTOS

1. Register a new command in CLI.
2. Create a new Task.
3. Interrupt handling.
4. Allocate resource using semaphores.
5. Share resource using MUTEX.
6. Avoid deadlock using BANKER'S algorithm.
7. Synchronize two identical threads using MONITOR.
8. Reader's Writer's Problem for concurrent Tasks.

Part-II

Experiments on ARM-CORTEX processor using any open source RTOS. (Coo-Cox-Software-Platform)

1. Implement the interfacing of display with the ARM- CORTEX processor.
2. Interface ADC and DAC ports with the Input and Output sensitive devices.
3. Simulate the temperature DATA Logger with the SERIAL communication with PC.
4. Implement the developer board as a modem for data communication using serial port communication between two PC's.

Lab Requirements:

Software:

(i) Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library, COO-COX Software Platform, YAGARTO TOOLS, and TFTP SERVER.

(ii) LINUX Environment for the compilation using Eclipse IDE & Java with latest version.

Hardware:

(i) The development kits of ARM-926 Developer Kits and ARM-Cortex Boards.

(ii) Serial Cables, Network Cables and recommended power supply for the board.

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(17D55208) INTERNET OF THINGS LAB

Using Python script

1. Interfacing light sensor/ LDR sensor –light dependent
2. Interfacing air quality sensor
3. Interfacing proximity sensor
4. Create an account in www.way2sms.com to your mobile number and sending an SMS
5. Give an alert to owner and cyber security cell through e-mail,when thief entered into the house.
6. Email based home automation electrical appliances should be controlled by sending an email from your account.
7. Interfacing temperature humidity sensor.
8. Reading data from cloud.
9. Running webserver on raspberry pi
10. Communicate multiple devices over socket.

Equipments Required:

1. Computer with latest configurations
2. Raspberry pi 2 model B

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(17D20301) RESEARCH METHODOLOGY
(Elective V-OPEN ELECTIVE)

UNIT I

Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

UNIT II

Sampling Design – steps in Sampling Design –Characteristics of a Good Sample Design – Random Sampling Design.
Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation.
Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

UNIT III

Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

UNIT IV

Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multi-variate Analysis.

UNIT V

Report Writing and Professional Ethics: Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

Text Books:

Research Methodology:Methods And Techniques – C.R.Kothari, 2nd Edition,New Age International Publishers.
Research Methodology: A Step By Step Guide For Beginners- Ranjit Kumar, Sage Publications (Available As Pdf On Internet)
Research Methodology And Statistical Tools – P.Narayana Reddy And G.V.R.K.Acharyulu, 1st Edition,Excel Books,New Delhi.

REFERENCES:

1. Scientists Must Write - Robert Barrass (Available As Pdf On Internet)
2. Crafting Your Research Future –Charles X. Ling And Quiang Yang (Available As Pdf On Internet)

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(17D20302) HUMAN VALUES AND PROFESSIONAL ETHICS
(Elective V-OPEN ELECTIVE)

Unit I:
HUMAN VALUES:Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Spirituality.

Unit II:
ENGINEERING ETHICS: Senses of Engineering Ethics- Variety of moral issues – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg‟s theory- Gilligan‟s theory- Consensus and controversy – Models of professional roles- Theories about right action- Self interest - Customs and religion –Uses of Ethical theories – Valuing time –Co operation – Commitment.

Unit III :
ENGINEERING AS SOCIAL EXPERIMENTATION: Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

UNIT IV:
ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK: Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing riskSafety and the Engineer- Designing for the safety- Intellectual Property rights(IPR).

UINIT V:
GLOBAL ISSUES: Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics .

Text Books :
1. “Engineering Ethics includes Human Values” by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. “Engineering Ethics” by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. “Ethics in Engineering” by Mike W. Martin and Roland Schinzinger – Tata McGrawHill– 2003.
4. “Professional Ethics and Morals” by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
5. “Professional Ethics and Human Values” by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran , Laxmi Publications.

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(17D20303) INTELLECTUAL PROPERTY RIGHTS
(Elective V-OPEN ELECTIVE)

UNIT – I

Introduction To Intellectual Property: Introduction, Types Of Intellectual Property, International Organizations, Agencies And Treaties, Importance Of Intellectual Property Rights.

UNIT – II

Trade Marks : Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT – III

Law Of Copy Rights : Fundamental Of Copy Right Law, Originality Of Material, Rights Of Reproduction, Rights To Perform The Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice Of Copy Right, International Copy Right Law.

Law Of Patents : Foundation Of Patent Law, Patent Searching Process, Ownership Rights And Transfer

UNIT – IV

Trade Secrets : Trade Secrete Law, Determination Of Trade Secrete Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secrete Litigation.

Unfair Competition : Misappropriation Right Of Publicity, False Advertising.

UNIT – V

New Development Of Intellectual Property: New Developments In Trade Mark Law ; Copy Right Law, Patent Law, Intellectual Property Audits.

International Overview On Intellectual Property, International – Trade Mark Law, Copy Right Law, International Patent Law, International Development In Trade Secrets Law.

TEXT BOOKS & REFERENCES:

1. Intellectual Property Right, Deborah. E. Bouchoux, Cengage Learing.
2. Intellectual Property Right – Nleashmy The Knowledge Economy, Prabuddha Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,