15ECP101	ADVANCED DIGITAL SYSTEM DESIGN	Semester-I			
		L	T	P	C
		3	1	-	4

COURSE OBJECTIVES

- To provide strong knowledge on Programmable Logic Devices and its usage in industrial automation.
- To understand number representation and conversion between different representation in digital electronic circuits.
- To analyze logic processes and implement logical operations using combinational logic circuits.
- To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines
- To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL
- To implement combinational and sequential circuits using VHDL

COURSE OUTCOMES

- Develop a digital logic and apply it to solve circuit problems
- Analyze, design and implement combinational logic circuits
- Classify different semiconductor memories
- Analyze, design and implement sequential logic circuits
- Analyze digital system design using PLD
- Simulate and implement combinational and sequential circuits using VHDL systems

UNIT I - Sequential Logic Circuits

Introduction to Sequential Logic Circuits - Mealy Machine- Moore Machine - State Diagrams - State Table Minimization - Incompletely Specified Sequential Machines - State Assignments - Design of Synchronous and Asynchronous Sequential Logic Circuits - Working in Fundamental and Pulse Mode.

UNIT II - Synchronous Sequential Circuit Design

Introduction of Clocked Synchronous Sequential Networks (CSSN) - Modeling of CSSN - State Table Assignment and Reduction – Design of CSSN - ASM Chart - ASM Realization.

UNIT III - Asynchronous Sequential Circuit Design

Introduction of Asynchronous Sequential Circuits (ASC)-Flow Table Reduction - Races in ASC - State Assignment - Problem and the Transition Table - Design of ASC - Static and Dynamic Hazards -Mixed Operating Mode Asynchronous Circuits.

UNIT IV - Programmable Logic Devices

Basic Concepts - Programming Technologies - Programmable Logic Element(PLE), Programmable Logic Array(PLA) - Programmable Array Logic(PAL) - Complex PLD's(CPLD) - System Design using PLD's - Design of Combinational and Sequential Circuits using PLD's.

UNIT V - Study of FPGA and XILINX

Introduction to Field Programmable Gate Arrays - Types of FPGA – Xilinx XC3000 Series - Logic Cell Array (LCA) - Configurable Logic Blocks (CLB) - Input/Output Block (IOB) - Programmable Interconnect Point (PIP).

TEXT BOOKS

1. Digital Principles and Design, Donald G.Givone, Tata McGraw Hill, First Edition, 2012.
2. Digital Systems: Principles and Applications, Gregory L. Moss, Ronald J. Tocci, Neal S. Widmer, Pearson Education, Tenth Edition, 2013

REFERENCES

1. Logic Design Theory, Nripendra N Biswas Prentice Hall of India, First Edition.2013.

15ECP102	MODERN COMMUNICATION SYSTEMS	Semester-I			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To learn the designing procedure and operation of circuits used for communication.
- To know the elements of modern communication systems
- To understand the basics and to identify the issues in today's communication systems, including satellite communication, Optical Fiber Communication and Digital cellular systems and cellular networks.
- To understand the basic concepts of AM, FM, and PM transmission and reception.
- To assess and evaluate different modulation and demodulation techniques.
- To evaluate the influence of noise on communications signals.

COURSE OUTCOMES

- Apply or a create suitable algorithm to solve a particular problem
- Understand and identify the fundamental concepts and various components of analog communication systems
- Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
- Describe analog pulse modulation techniques and digital modulation technique
- Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
- Use of different modulation and demodulation techniques used in analog communication

UNIT I -Wave Propagation

EM Waves – Free Space Propagation – Surface Wave Propagation – Sky Wave Propagation – Space Wave Propagation – Trophospheric Scatter Propagation – Structure of Atmosphere – Characteristics of Ionized Regions – Virtual Height – Maximum Usable Frequency - Lowest Usable Frequency – Skip Distance – Optimum Working Frequency – Ionospheric Abnormalities – Duct Propagation.

UNIT II - Satellite Communication

System Description – Telemetry, Tracking and Command – Communication Space Craft – Satellite Orbit – GEO – LEO – MEO – Satellite Position – Linkage – Frequencies – Inside the Satellite: Transponder – Antenna Systems – Power Packages – Station Keeping – Ground Station – Aligning the Satellite Dish.

UNIT III - Optical Fiber Communication

Basic Fiber Optic System – Frequencies – Fiber Optic Cables – Refraction – Numerical Aperture – Graded Index Cables – Single Mode – Multimode – Cable Constructions – Cable Losses – Connecter – Light Sources – Light Detector - System Components – Advantages And Disadvantages.

UNIT IV - Digital Cellular Systems

GSM Architecture – Layer Modeling – Transmission – Data Service – Multiple Access Scheme – Channel Coding Interleaving – Radio Resource Management – Mobility Management – Communication Management – Network Management – TDMA Architecture – Transmission and Modulation – CDMA – Terms of CDMA Systems – Call Processing – Handover Procedures.

UNIT V - Intelligent Network for Wireless Communication

Intelligent Cell Concept – Intelligent Micro Cell Operation – Applications – Advanced Intelligent Network (AIN): Evaluation – Architecture – ISDN for AIN – AIN for Mobile – Asynchronous Transfer Mode (ATM) Technology: TM Network Concept – Applications – Wireless Information Super Highway.

TEXT BOOKS

1. Electronic Communication Systems, Kennedy and Davis,Tata McGraw Hill, fifth Edition, 2012.
2. Mobile Cellular Telecommunications, Willian C.Y.Lee,McGraw Hill,Second Edition ,2012

REFERENCES

1. Electronic Communications Modulation and Transmission, Robert J Schoenbeck, PHI, Second Edition, 2011.

15ECP103	SIGNALS AND SYSTEMS	Semester-I			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To understand the process of convolution between signals and able to solve differential equation using Laplace transform techniques.
- To understand the intuitive meaning of frequency domain and the importance of analyzing and processing signals in the frequency domain.
- Able to compute the Fourier series or Fourier transform Z-transform
- To introduce students the concept and theory of signals and systems needed in electronics and telecommunication engineering fields
- Knowledge about basic signal and system modeling concept and definitions
- Knowledge about the application and use of mathematical transforms and state-variables in order to solve electrical engineering problems

COURSE OUTCOMES

- Understand about various types of signals and systems, classify them, analyze them and perform various operations.
- Understand the use of transform to analysis of signals and systems in continuous and discrete time domain
- Implement the concept and theory of signals and systems in electronics and communication field.
- Ability to have idea of signal and system analysis and its characterization in time and frequency domain
- Students can perform mathematical and graphical convolution of signals and systems.
- Compute the Fourier series or Fourier transform Z-transform

UNIT I - Signals and systems

Introduction - CT and DT Signals – Transformation of the Independent Variable – CT and DT Systems – Basic System Properties. LTI System: - Introduction – DT LTI Systems – CT LTI Systems – Properties of LTI System.

UNIT II - Fourier series representation of Periodic signals

Introduction – Fourier Series Representation of CT Periodic Signals – Properties of CT Fourier Series – Fourier Series Representation of DT Periodic Signals – Properties of DT Fourier Series – Fourier Series and LTI System – Filtering.

UNIT III - CT and DT Fourier Transform

Introduction – Representation of Periodic Signals in Continues Time Fourier Transform – Fourier Transforms for Periodic Signals - Properties of the CT Fourier Transform – Convolution Property – Multiplication Property - Discrete Time Fourier Transform - Introduction – Representation of Periodic Signals in DT Fourier Transform – Fourier Transform for Period Signals – Properties of Discrete Time Fourier Transform - Convolution Property – Multiplication Property – Duality.

UNIT IV - Sampling

Introduction - Sampling Theorem – Reconstruction of a Signal From its Samples using Interpolation – Aliasing – DT Processing of a CT Signals – Sampling of DT Signals.

UNIT V - Laplace and Z transform

Introduction – Laplace Transform – Region of Convergence For LT – Inverse Laplace Transform – Properties of Laplace Transform - Z-Transform:- Introduction – Z-Transform – Region of Convergence for Z-Transform – Inverse Z–Transform – Properties of Z-Transform.

TEXT BOOKS

1. Signals and Systems, Alen V. Oppenheim Alan S. Wilsky and Hamid Nawab S, PHI, Second Edition, 2012.
2. Signals and Systems, Simon Haykin and Barry Van Veen,John Wiley & sons Inc.Second Edition,2012

REFERENCES

1. Signals and Systems, Anand Kumar.A, PHI Learning Press, Third Edition, 2013.

15ECP104	EMBEDDED SYSTEMS	Semester-I			
		L	T	P	C
		3	1	-	4

COURSE OBJECTIVES

- Ability to design an Embedded System, component or process to meet desired needs within realistic constraints.
- To develop the next generation technologies, methods and tools for modeling, design, implementation and operation of hardware/software systems embedded in intelligent devices
- To understand the need and applications of Microcontrollers n embedded system.
- To understand architecture and features of typical Microcontroller.
- Learn interfacing of real world input and output devices
- To study various hardware and software tools for developing applications embedded systems

COURSE OUTCOMES

- Understand hardware and software design requirements of embedded systems.
- Acquire knowledge about embedded processors and their applications
- Analyze the embedded systems specification and develop software programs.
- Ability to design an Embedded System, component or process to meet desired needs within realistic constraint
- Evaluate the requirements of programming embedded systems and tool chain for embedded systems.
- Explore the features of the microcontroller and provide solutions for embedded applications

UNIT I - PIC 18F Microcontroller

Introduction to Microcontroller: Brief History of The PIC Microcontroller – PIC18 Features and Block Diagram – PIC18 Architecture - Addressing Modes – Instruction Set – PIC I/O Port Programming.

UNIT II – Embedded C Programming

Introduction to C Programming: Data Types in C - I/O Port Programming in C - Bit-Addressable I/O Programming - Logic Operations in C - Data Conversion Programs in C.

UNIT III - PIC Peripherals and Interfacing

Introduction to PIC Peripherals and Interfacing: PIC18 Timer Programming in Assembly and C - Serial Port Programming in Assembly and C - Interrupt Programming in Assembly and C - ADC and DAC Interfacing - CCP and ECCP Programming - DC Motor Interfacing and PWM.

UNIT IV - Introduction to Embedded Systems

Introduction to Embedded Systems Characteristics of Embedded Systems - Software Embedded into a Systems - Device Drivers and Interrupt Servicing Mechanisms - Inter-Process Communication and Synchronization of Process - Tasks and Threads: Multiple Processes in an Application – Data Sharing by Multiple Tasks and Routines – Inter Process Communication.

UNIT V - Embedded Design Process

Embedded Design Life Cycle – Product Specification – Hardware / Software Partitioning – Detailed Hardware and Software Design – Integration – Product Testing – Selection Processes – Microprocessor Vs Micro Controller – Performance Tools – Bench Marking –RTOS Micro Controller Tool Chain Availability – Other Issues in Selection Processes.

TEXT BOOKS

1. Programming and Customizing the PIC Microcontroller, Myke Predko, Tata McGraw - Hill Education, Third Edition, 2010.
2. Embedded Systems Architecture Programming and Design, Rajkamal, Tata McGraw Hill Publications. Third Edition, 2014.

REFERENCES

1. PIC Microcontroller and Embedded Systems using assembly and C for PIC18 –Muhammad Ali Mazidi, Roind D. Mckinay, Danny Causey, Pearson Education, First Edition,2010.

15ECP105	ADVANCED ELECTRONIC CIRCUIT THEORY	Semester-I			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- Ability to design different types of Electronic Circuits such as Amplifiers and Oscillators.
- To understand and implement the advanced electronic circuits such as amplifiers etc with the help of theoretical and practical problem solving.
- Ability to analyze the different types of configurations and applications of Transistor.
- Ability to determine the stability of feedback amplifiers and their steady state performance.
- To analyze the Circuits in time and frequency domain
- Calculation and measurement of parameters for electronic circuits, to introduce the students to the advanced concepts of electronics.

COURSE OUTCOMES

- Know the characteristics of diodes and transistors
- Design simple circuits and know the benefits of feedback in amplifier
- Apply their knowledge in analyzing Circuits by using network theorems.
- Measure the characteristics of electronic circuits and present experimental results
- Compare and classify oscillators
- Analyze electrical circuits and calculate the main parameters

UNIT I - Semiconductor Devices

Conductor – Semiconductor – Intrinsic Semiconductor – Extrinsic Semiconductor – P Type and N Type Semiconductor – PN Junction Diode – V-I Characteristics - Zener Diode – V-I Characteristics Construction of NPN and PNP Transistors – Operation of NPN, PNP Transistors – Characteristics of CE and CB Transistor Configurations

UNIT II - Circuit Analysis

Mesh Analysis - Mesh Equation by Inspection Method - Nodal Analysis – Source Transformation Technique – Star to Delta Transformation. Network Theorems: Superposition Theorem - Thevenis's Theorem - Norton's Theorem – Reciprocity Theorem – Maximum Power Transfer Theorem – Millman's Theorem.

UNIT III - Analog Electronics

Detailed Analysis of BJT and FET Biasing Circuits - Stability Considerations - Analysis of Single and Multistage Amplifiers - Amplifier with Different types of Feedbacks - Power Amplifiers - Tuned Amplifiers and Oscillators - Linear Integrated Circuits - Process Technology - Differential Amplifiers and Current Mirrors - Op-Amp Details. Op-Amp Circuits and Applications - Active Filters - Functional Amplifiers.

UNIT IV - Thyristors and Special diodes

SCR - Construction – Characteristics – Two Transistor Version – Thyristor ratings -LASER – TRIAC – DIAC - Zener Diode - Avalanche Break Down – Zener Breakdown – Application of Zener - Varactor Diode – Schotty Diode - Tunnel Diode - Gunn Diode – IMPATT Diode - PIN Diode – LASER Diode.

UNIT V - AC Fundamentals

Electrical Sources - AC Waveforms - Frequency, Phase, Amplitude, Peak, RMS, Calculation of Power, Response of Passive Components on AC Waveforms – Impedance in RLC Circuit - Transient Analysis of Electric Circuits - Steady State Analysis of Circuits - Network Theorems(Ac Circuits) - Two Port Networks – Resonance.

TEXT BOOKS

1. Electronic Devices and Circuits, David.A. Bell, Oxford University Press 5th Edition, 2008.
2. Circuit Theory : Analysis and Synthesis, Abhijit Chakrabarti, Dhanpat Rai & Co. Sixth Edition, 2014

REFERENCES

1. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar & A.Vallavaraj, Tata Mc Graw-Hill publishing Company Limited, Fourth Edition, 2013.

.15ECP111	PRACTICAL – I ADVANCED ELECTRONIC CIRCUITS AND COMMUNICATION LAB	Semester-I			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- To identify and test various electronic components
- To use DSO for various measurements
- To plot the characteristics of diode and transistor
- To design and implement feedback amplifier circuits
- To measure the frequency of oscillators.
- To design and test regulated power supplies

COURSE OUTCOMES

- Verify the rectifier circuits using diodes and implement them using hardware
- Design the biasing circuits like self biasing
- Understand the construction, operation and characteristics of FET which can be used in the design of amplifiers
- Design simple circuits
- Know the benefits of feedback in amplifier
- Compare and classify oscillators.

(Any 10 Experiments)

1. Design of Double stage RC coupled amplifier
2. Design of Common Source FET Amplifier
3. Design of Feedback amplifier
4. Design of Wein bridge oscillator
5. Design of Phase shift oscillator
6. Design of Colpitts and Hartley oscillator
7. Design of Schmitt trigger
8. Design of AM Modulation
9. Design of FM Modulation
10. Design of PAM Modulation
11. Design of PPM Modulation
12. Design of PWM Modulation

15ECP112	PRACTICAL – II EMBEDDED SYSTEMS LAB	Semester-I			
		L	T	P	C
			-	4	2

COURSE OBJECTIVES

- Demonstrate the sensing of different physical parameters
- Explain the calibration of parameters measured and displayed
- Evaluate the data transfer
- To understand the need and applications of Microcontrollers and ARM Processors in embedded system.
- To understand architecture and features of typical Microcontroller
- To learn interfacing of real world input and output devices

COURSE OUTCOMES

- Define the arithmetical and logical assembly language for microcontroller
- Know the downloading procedure on hardware into flash ROM and show the testing data on defined port wish board
- Competent to evaluate the data transfer response
- Able to describe the microcontroller and ARM Processor Architecture and its Features
- Learn importance of microcontroller and ARM Processor in designing embedded applications
- Learn use of hardware and software tools.

(Any 10 Experiments)

1. Writing and testing programs involving arithmetic, logical and BIT oriented instructions.
2. LED interfacing
3. Data transfer program with parallel port
4. Key interfacing and Seven segment display interface
5. Stepper motor controller interface
6. Speed control of DC motor
7. PWM generation
8. Temperature monitoring and control
9. Waveform generation
10. A/D converter interface
11. D/A converter
12. LCD interface

15ECP201	VLSI DESIGN AND VHDL PROGRAMMING	Semester-II			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To learn the basics of language elements.
- To provide a strong knowledge about the VHDL Modeling.
- To introduce a hardware description language (HDL) for the specification, simulation, synthesis
- Implementation of digital logic systems.
- Design practice sessions and implementing digital logic systems with commercial electronic design (EDA) tools
- To know the features of programming and simulation techniques.

COURSE OUTCOMES

- Building simulation module as per system specification for e.g. VHDL model for ASIC design
- Understanding types of design such as high level design, operative part design, control part design, memory design etc
- Functioning and specifying the tools used for design as per requirement
- Creation of code, verification, testing software
- Testing various examples on the system
- Understanding the synthesis and simulation process of code

UNIT I - Introduction and Basic Concepts of VHDL

History of VHDL – Capabilities of VHDL – Hardware Abstraction – Basic Terminology – Entity Declaration - Architecture Body Declaration – Basic Language Elements – Identifiers – Data Objects – Data Type Operators.

UNIT II - Behavioral Modeling Techniques of VHDL

Behavioral Modeling: Entity Declaration – Architecture Declaration – Process Statements Variable Assignment Statements – Signal Assignments Statements – Wait Statement – IF Statement – Case Statement – Null Statement – Loop Statement – Exit Statement – Next Statement – Assertion Statement – Report Statements – More On Signal Assignment Statement – Multiple Process – Postponed Process.

UNIT III - Data Flow Modeling Techniques of VHDL

Data Flow Style of Modeling: Concurrent Signal Assignment Statement versus Signal Assignment – Delta Delay Revisited – Multiple Drivers – Conditional Signal Assignment Statement – Selected Signal Assignment Statement – Unaffected Value – Block Statement - Concurrent Assertion Statement.

UNIT IV - Structural Modeling

Component Declaration – Component Instantiation – Resolving Signal Value – Examples – Half Adder – Full Adder – Four to One Multiplexers – Decoders and Encoders.

UNIT V - Advanced Features in VHDL

Generics – Configuration – Configuration Specification – Configuration Declaration – Default Rules – Conversion Functions – Direct Instantiation – Incremental Binding – Sub Programs – Sub Program Overloading - Operator Overloading – Signatures.

TEXT BOOKS

1. A VHDL Primer, J. Bhasker, Pearson Education. Third Edition, 2010.
2. VHDL: Programming by Examples, Douglas.P.Perry,Mc Graw Hill Publications, Fourth Edition,2014.

REFERENCES

1. HDL Programming VHDL and Verilog, Nazeih M. Botros, Wiley India Pvt. Ltd, First Edition, 2012
2. Introductory VHDL: From Simulation to Synthesis, Yalamanchili, 1st Edition, 2011.

15ECP202	ARM MICROCONTROLLER	Semester-II			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- Demonstrate the sensing of different physical parameters
- Explain the calibration of parameters measured and displayed
- Evaluate the data transfer
- To understand the need and applications of Microcontrollers and ARM Processors in embedded system.
- To understand architecture and features of typical Microcontroller
- To learn interfacing of real world input and output devices

COURSE OUTCOMES

- Define the arithmetical and logical assembly language for microcontroller
- Know the downloading procedure on hardware into flash ROM and show the testing data on defined port wish board
- Able to describe the microcontroller and ARM Processor Architecture and its Features
- Learn importance of microcontroller and ARM Processor in designing embedded applications
- Learn use of hardware and software tools.
- Develop interfacing to real world devices.

UNIT I - Introduction to Embedded System and LPC 2148 ARM Controller

Definition of Embedded System – Features of Embedded System – Types of Embedded System - LPC 2148 ARM Controller – Block Diagram – Memory and On Chip Peripheral Devices – ARM 7 TDMI - S CPU Registers – Modes of Operation – PSW.

UNIT II - Embedded C basics, GPIO (Slow), Timer and Interrupts

Embedded C Basics – GPIO (Slow) Register Map - Pin Connect Block - 8 Bit LED'S – 8 Bit Switches – Buzzer – Relay – Stepper Motor Interfaces -Timer/Counter – Block Diagram – Register Map – Program for Time Delay and Counter Operation - Register Map – External Interrupts - Timer/Counter based Interrupt.

UNIT III - PWM, ADC, DAC and RTC

PWM Features – Block Diagram – Register Map – Program for Generating Single Ended PWM - ADC Feature – Block Diagram – Register Map – Program for ADC and Temperature Sensor LM 35 Interface - DAC Feature – Block Diagram – Register Map – Program for Generating Analog Output - RTC Feature – Block Diagram – Register Map – Program for displaying the Time in LCD Display.

UNIT IV - Serial and Parallel Communication

UART Feature – UART0 Block Diagram – Register Map – Transmission and Reception of Messages for PC – SSP Feature – Register Map.

UNIT V - I2C

Introduction to I2C – I2C Feature in LPC 2148 – Block Diagram – Register Map – I2C Master Mode Operation – Interfacing I2C based I/O Expander PCF 8574 – Interfacing LED – 7 Segment Display – Interfacing I2C based EEPROM – Programs.

TEXT BOOK

1. ARM Microcontroller Interfacing: Hardware and Software, Warwick A. Smith, Gazelle Books Services, Second Edition, 2010.

REFERENCES

1. ARM Microcontroller, B. Shantha Kumar Naik, Sapna Books House, First Edition, 2013.

15ECP203	TELECOMMUNICATION SYSTEMS	Semester-II			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To learn the designing procedure and operation of circuits used for communication.
- To understand the basic concepts of AM, FM, and PM transmission and reception.
- To assess and evaluate different modulation and demodulation techniques.
- To evaluate the influence of noise on communications signals.
- To introduce students to various modulation and demodulation techniques of analog communication
- To analyze different parameters of analog communication techniques.

COURSE OUTCOMES

- Apply or a create suitable algorithm to solve a particular problem
- Understand and identify the fundamental concepts and various components of analog communication systems
- Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
- Describe analog pulse modulation techniques and digital modulation technique
- Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
- Use of different modulation and demodulation techniques used in analog communication

UNIT I - Overview of Telecommunication

Introduction-History of Telecommunication-Telecommunication Network Internet - Classification of Data Network-Telecommunication Standards.

UNIT II - Electronics for Telecommunication

Introduction - Communication System Parameters - FDM – TDM - WDM. Transmission Media: Introduction – Fiber Optic Cables - Cabling Architecture.

UNIT III - Voice Communication

Introduction - Public Telephone Network - Telephone Types - Circuit – Out Going – Incoming Calls - Line Signaling – Intelligent Network Services - Business Telephone Systems.

UNIT IV - Wide Area Network and Broad Band Technologies

Introduction – Packet Switching Network - X.25 Frame Relay – SMDS – ISDN – SONET – ATM – POS – DTM - DSL – CM's - PON.

UNIT V - Network Management

Introduction - Policy Management - Evolution of Network Hardware and Software - Network Administration and Maintenance - Network Security Configuration Management – Telecommunication Management Network.

TEXT BOOK

1. Introduction to Telecommunication, Gokhale, Delmar Publications, First Edition, 2011.

REFERENCES

1. Telecommunication Switching, Traffic Networks, JE Flood, Pearson Education, Tenth Edition, 2011.
2. Telecommunication Switching Systems and Networks, Thiyagarajan Viswanath, Prentice Hall of India, Second Edition, 2010.

15ECP204A	MEMS AND CONTROL ENGINEERING	Semester-II			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To learn the various micro fabrication technologies for MEMS
- To understand unique requirements for MEMS fabrication
- To know about the current trends and future technology for MEMS
- To employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions
- Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system
- Formulate different types of analysis in frequency domain to explain the nature of stability of the system

COURSE OUTCOMES

- Ability to describe MEMS fabrication technologies
- Apply fundamental concepts of MEMS to solve real life engineering problems
- Identify problems and suggest suitable MEMS material/ Devices/Process to get the Requisite Solution for a given application
- Apply advanced MEMS techniques to solve future engineering problems. Capability to critically analyze microsystems technology for technical feasibility as well as practicality Understand the concept of time response and frequency response of the system.
- Analyze feedback characteristics of linear control systems to reduced the disturbance
- Perform frequency domain analysis of linear control system using nyquist stability criterion

UNIT I - Overview and Working Principles of MEMS

MEMS and Microsystems – Typical MEMS and Microsystems Products – Microsystems and Microelectronics – Miniaturization – Applications of Microsystems – Micro Sensors, Micro Actuation, Micro Grippers, Micro Motors, Micro Accelerometer.

UNIT II - Fabrication and Microsystems Design

Ions and Ionization – Doping – Diffusion Process – Scaling Laws For Electrical Design – Substrate and Wafers – Silicon as a Substrate – Silicon Compounds – Piezo Resistors – Piezo Crystals - Photolithography – Ion Implantation – Diffusion – Oxidation – PVD – Etching – Surface Micro Matching – LIGA Process – Micro System Design Considerations

UNIT III - Concepts of Control System

Introduction – Open and Closed Loop Systems – Examples – Elements of Closed Loop Systems – Linear and Nonlinear System - Effect of Feedback on Overall Gain, Stability, Sensitivity and Noise – Transfer Function of Closed Loop System – Block Diagram Algebra and Reduction – Mason's Gain Formula.

UNIT IV -Time Response Analysis and Stability in Time and Frequency Domain

First Order System: Impulse and Step Input Analysis – Second Order System Analysis – Steady State Error – Stability Analysis: Routh Hurwitz Criterion – Root Locus Method – Construction and Application - Nyquist Stability Criterion – Bode Diagrams – Polar Plot.

UNIT V - Design of Digital Control System

Z Plane Specifications of Control System Design – Digital Compensator Design – Frequency Response Method - State Feedback – Pole Placement Design – State Observers – Digital Filter Properties – Frequency Response – Kalman's Filter.

TEXT BOOKS

1. MEMS & Microsystems Design & Manufacture and Nano Scale Engineering, Tai-Ran Hsu, Wiley Publications, Second Edition, 2011.
2. Control Systems Engineering, R.Ananada Natrajan, P. Ramesh Babu, SCITECH Publications, Fifth Edition, 2012

REFERENCES

1. Digital Control Engineering, M.Gopal, New age International (p) Ltd, Fifth Edition, 2012.

15ECP204B	LOW POWER VLSI DESIGN	Semester-III			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To learn the fabrication techniques of Integrated Circuits.
- To know the fundamental rules of layout design.
- To design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout
- Importance of CMOS and Mixed Signal VLSI design in the field of Electronics and Telecommunication
- Underlying methodologies for analysis and design of fundamental CMOS Analog and Mixed signal Circuits like Current and Voltage references, Single stage Amplifiers, Operational Amplifiers, Data Converters
- The issues associated with Mixed Signal VLSI Circuits.

COURSE OUTCOMES

- Realize logic circuits with different design styles.
- Understand working principle of operation of different types of memories.
- Familiarize with the fabrication techniques of Integrated Circuits.
- Design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout.
- Express the layout of simple MOS Circuit using Lambda based design rules.
- Design an application using Verilog HDL

UNIT I - Power Dissipation in CMOS

Hierarchy of Limits of Power – Sources of Power Consumption – Physics of Power Dissipation in CMOS FET Devices - Basic Principle of Low Power Design.

UNIT II - Power Optimization

Logical Level Power Optimization – Circuit Level Low Power Design – Circuit Techniques for Reducing Power Consumption in Adders and Multipliers.

UNIT III - Design of Low Power CMOS Circuits

Computer Arithmetic Techniques for Low Power Systems – Reducing Power Consumption in Memories – Low Power Clock, Interconnect and Layout Design – Advanced Techniques – Special Techniques

UNIT IV - Power Estimation

Power Estimation Techniques – Logic Level Power Estimation – Simulation Power Analysis – Probabilistic Power Analysis.

UNIT V - Synthesis and Software Design for Low Power

Synthesis for Low Power – Behavioral Level Transforms - Software Design for Low Power

TEXT BOOKS

1. Low Power CMOS VLSI Circuit Design, K.Roy and S.C. Prasad, Wiley Publications, 2011,
2. Low Voltage CMOS VLSI Circuits, Kuo J.B. and Lou J.H, Wiley Publications, 2008.

REFERENCES

1. Low Power Digital CMOS Design, Chandrakasan A.P. and Broadersen R.W. Wiley Publications, 2008.

15ECP204C	REAL TIME OPERATING SYSTEMS	Semester-V			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To know the Fundamental elements of real-time multitasking embedded application software design and development. Processor and operating system concepts
- To provides a broad introduction to real time systems and their programming.
- To make the students to understand the fundamental problems, concepts, and approaches in the design and analysis of real-time systems
- To provides a broad introduction to real time systems and their programming.
- To make the students to understand the fundamental problems, concepts, and approaches in the design and analysis of real-time systems.
- To study issues related to the design and analysis of systems with real-time constraints.

COURSE OUTCOMES

- Program the Arduino microcontroller to make the circuits work
- Compare different scheduling algorithms and the schedulability criteria.
- Determine schedulability of a set of periodic tasks given a scheduling algorithm.
- Develop algorithms to decide the admission criterion of sporadic jobs
- To know the schedule of aperiodic jobs.
- Integrate resource access mechanisms with the scheduling techniques and develop integrated schedulibility criteria.
- Enumerate the need and the challenges in the design of hard and soft real time systems.

UNIT I - Introduction

Real-Time Computation – Structure of A Real-Time System – Task Classes – Performance Measures For Real-Time Systems – Estimating Program Run Times – Task Assignment and Scheduling – Classical UniProcessor Scheduling Algorithms – Uniprocessor Scheduling of IRIS Tasks – Task Assignment – Mode Changes – Fault Tolerant Scheduling

UNIT II - Real-Time Models

Event-Based, Process-Based and Graph-Based Models – Pertinent Models –Real-Time Languages – System Performance Analysis – Optimization of Time Loading and Memory Loading Models of Multiprocessor Systems and Distributed Systems – Task Assignment – End to End Tasks in Heterogeneous Systems – Temporal Distance Constraints – Resource Contention – Resource Access Control – Priority Ceiling – Multiple Unit Resource Access.

UNIT III - RTOS Concepts

Foreground and Background Process – Resources – Tasks–Multitasking – Priorities – Schedulers – Kernel – Exclusion – Inter-Task Communication – Interrupts – Clock Tick – Micro C/OS II Kernel Structure – Micro C/OS II Initialization – Starting Micro C/OS II

UNIT IV - RTOS Functions

Task Management – Time Management – Semaphore Management – Mutual Exclusion - Semaphore – Event Management – Message Management – Memory Management – Porting Micro C/OS II

UNIT V - Real-Time Kernel and RTOS Applications

Principles – Design Issues – Polled Loop Systems – RTOS Porting to a Target – Comparison and Study of QNX, Vx works and PSOS – RTOS for Image Processing – Embedded RTOS for VOIP – RTOS for Fault - Tolerant Applications .

TEXT BOOKS

1. Real-Time Systems, Krishna, and Kang Shin, McGraw Hill, First Edition, 2009.
2. Real-Time Systems: Theory and Practice, Rajib Mall, Pearson Education, First Edition, 2009.

REFERENCES

1. Real-Time Design and Analysis – An Engineer's Handbook, Philip Laplante, John Wiley Publications, 2003
2. Micro C/OS II - The Real-Time Kernel, Jean Labrosse, CMP Books, Second Edition, 2002.

15ECP204D	AUTOMOTIVE ELECTRONICS	Semester-II			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To understand the concept of automotive systems, vehicles dynamics, electrical and electronic systems used in automobiles
- To know the concepts and develop basic skills necessary ti diagnose in an automatic electronic systems
- To analyze and design the electronic systems for controlling mechanical systems in automobiles
- To test and validate automotive electronic systems
- To apply state-of-art software and hardware tools and techniques for development of automotive electronic systems
- To design modern embedded software and electronic hardware based products for automotive applications.

COURSE OUTCOMES

- Enumerate the construction, characteristics and maintenance of different accessories in a typical automobile system
- Explain the constructin characteristics and maintenance of ignition sstem and and diagnose the ignition system fault of any vehicle
- List out the principles and characteristics of charging system co pnents and demonstrate their working with suitable tools
- Describe the principle and architecture of electronic sytems and its components present in an automobile related to instrumentation, control and security systems
- Knowledge about handling of industrial automated control systems and working of automotive communication systems.
- Enumerate the principles, application construction and specification of different sensors and actuators

UNIT I - Power Train Engineering and fundamentals of Automotive

Fundamentals of Petrol, Diesel and Gas Engines - Electric Motors and Control Systems - Basic Automotive System - System Components - Evolution of Electronics in Automotive - Alternators and Charging - Battery Technology - Ignition Systems.

UNIT II - Sensor technologies in Automotive

In-Vehicle Sensors: Working Principles – Characteristics – Limitations - Distance Sensing- Velocity Sensing - Vibration Sensing – Airbags - Flow Sensing and Measurement.

UNIT III - Automotive Control Systems

Control System Approach in Automotive: Analog and Digital Control Methods - Stability Augmentation - Control Augmentation - Transmission Control - Motion Equations - Modeling of Linear and Non-Linear Systems - Spark Ignition and Compression Ignition Engines.

UNIT IV - Electronic Control Unit Design

Architecture of 8 /16 Bit Microcontrollers – Ports - Timer/Counters – Interrupts - Watch-Dog Timers - PWM, - High-Level Language Programming: Operators - Control Constructs.

UNIT V - Automotive Communication Systems

Communication Interface with ECU's: Interfacing Techniques -Wireless LAN's Standards-CAN - LIN - Application of Telemetries in Automotive: Global Positioning Systems (GPS) - General Packet Radio Service (GPRS).

TEXT BOOKS

1. Understanding Automotive Electronics, Ribbens William and B Ribbens, Elsevier Science, Seventh Edition, 2012.
2. Mechatronics: Integrated Mechanical and Electronic System, K.P.Ramchandran, G.K.Vijayraghavan, M.S. Balsundaram, Wiley India Publications, Eighth Edition, 2010.

REFERENCES

1. Fundamentals of Automotive Electronics, V.A.W.Hiller, Trans Atlantic Publications, Fifth Edition, 2010

15ECP204E	ANDROID AND ITS APPLICATIONS	Semester-II			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- Ability to design an Embedded System, component or process to meet desired needs within realistic constraints.
- To develop the next generation technologies, methods and tools for modeling, design, implementation and operation of hardware/software systems embedded in intelligent devices.
- To provide a broad overview of both theoretical and practical aspects of a design flow for embedded systems.
- To learn the basics of electronics, including reading schematics (electronics diagrams)
- To learn how to prototype circuits with a breadboard
- To learn the Arduino programming language and IDE

COURSE OUTCOMES

- Program the Arduino microcontroller to make the circuits work
- Understand the value and importance of learning a coding language
- Transform a physical input into a digital input and analyze it
- Connect the Arduino microcontroller to a serial terminal
- To understand communication and stand-alone use Program basic Arduino examples
- Explore the provided example code and online resources for extending knowledge about the capabilities of the Arduino microcontroller

UNIT I - Introduction

About Android - Smart Phones Future - Android Architecture - Android Stack - Android Application Structure - Smart Phone's Future.

UNIT II - Java Concept

Oops Concepts - Inheritance in Detail - Exception Handling - Packages & Interfaces - JVM & .Jar File Extension - Multi Threading (Thread Class & Runnable Interface).

UNIT III - Basic UI design

Introduction to UI Design - Form Widgets**:** Text Fields – Layouts – [DIP, DP, SIP, SP] Versus PX – Examples. Time and Date - Images and Media – Composite – Alert Dialogs & Toast – Popup – Examples.

UNIT IV – Menu and Intents

Menu : Option Menu - Context Menu - Sub Menu - Menu From Xml - Menu Via Code – Examples. Intents : Explicit Intents - Implicit Intents – Examples.

UNIT V - Animation and Network Communication

Introduction to Animation and Network Communication - View Animation - Drawable Animation

TEXT BOOK

1. Android Apps for Absolute Beginners, Wallace Jackson, Wiley India Pvt. Ltd, Second Edition, 2013.

REFERENCES

1. Android Programming: Pushing the Limits, Erik Hellman, Wiley India Pvt Ltd, First Edition, 2014.

15ECP211	PRACTICAL – III VLSI LAB	Semester-II			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- Introduced digital integrated circuits
- Introduce CMOS devices and manufacturing technology.
- Introduce CMOS logic gates and their layout.
- Ability to find Propagation delay, noise margins, and power dissipation in the digital VLSI circuits.
- Ability to design Combinational (e.g., arithmetic) and sequential circuit.
- Ability to design Memory in VLSI circuits.

COURSE OUTCOMES

- Analyze the CMOS layout levels, how the design layers are used in the process sequence, and resulting device structures (i.e. cross-sectional views).
- Design and implementation of logic gates
- Implement digital logic designs of various types (i.e. combinational logic, multiplexers).
- Analyze performance issues and the inherent trade-offs involved in system design (i.e. power vs. speed).
- Complete a moderately complex design project involved with data path operators, data registers, serial/parallel conversion, clocking/timing details and feedback.
- Identify the interactions between process parameters, device structures, circuit performance, and system design.

(Any 10 Experiments)

1. Design and implementation of logic gates
2. Design and implementation of half adder & full adder
3. Design and implementation of half Subtractor & full Subtractor
4. Design and implementation of Encoder & decoder
5. Design and implementation of 4 bit & 8 bit multiplexer
6. Design and implementation of flip flops
7. Design and implementation of up/down counters
8. Design and implementation of shift register
9. Design and implementation of ALU
10. Design and simulation of Programmable Logic Array
11. Design and simulation of Traffic light Controller
12. Design and simulation of Real time clock

15ECP212	PRACTICAL – IV ARM MICROCONTROLLER LAB	Semester-II			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- Demonstrate the sensing of different physical parameters
- Explain the calibration of parameters measured and displayed
- Evaluate the data transfer
- To understand the need and applications of Microcontrollers and ARM Processors in embedded system.
- To understand architecture and features of typical Microcontroller
- To learn interfacing of real world input and output devices

COURSE OUTCOMES

- Define the arithmetical and logical assembly language for microcontroller
- Know the downloading procedure on hardware into flash ROM and show the testing data on defined port wish board
- Able to describe the microcontroller and ARM Processor Architecture and its Features
- Learn importance of microcontroller and ARM Processor in designing embedded applications
- Learn use of hardware and software tools.
- Develop interfacing to real world devices.

(Any 10 Experiments)

1. Arranging the numbers in ascending and descending order in an array using a simulator.
2. LED Interfacing
3. LCD Interfacing.
4. Stepper Motor Interfacing.
5. PWM generation.
6. ADC interface.
7. DAC interface
8. Digital Clock
9. LCD Interfacing
10. A/D converter interface
11. Interfacing PWM
12. Interfacing serial port

15OEP201	DATA COMMUNICATION NETWORKS	Semester-III			
		L	T	P	C
		-	-	-	3

COURSE OBJECTIVES

- To understand the communication protocols and layered network architectures.
- To explain conventional computer system interfacing standards and peer to peer data link communication protocols.
- To know the designing concepts of basic network systems and various components in a data communication system.
- To represent a digital signal using several modulation methods
- Draw signal space diagrams compute spectra of modulated signals and apply redundancy for reliable communication.
- To make students familiar with fundamentals of mobile communication systems

COURSE OUTCOMES

- Understand the basics of information theory, source coding techniques and calculate Entropy of source
- To know the various types of noises in communication systems and reduction techniques
- Describe and determine the performance of line codes and methods to mitigate inter symbol interference
- Learn the generation and detection of base band system
- Understand the generation, detection signal space diagram, spectrum, bandwidth efficiency, and probability of error analysis of different band pass modulation techniques
- Describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel.

UNIT 1 - Introduction

Definition of Networks – Classification of Networks – LAN, MAN, WAN, Internet – Network Topology – Protocols and Standards – Network Models – OSI, TCP/IP Models of Networking – Internet

UNIT II - Physical Layer and the Media

Review of Signals – Data Rate Limits – Performance Issues – Bandwidth, Throughput, Latency, Bandwidth - Delay Product- Jitter-Digital Transmission - Analog Transmission: Line Coding Techniques- PCM - Delta Modulation Techniques – ASK, FSK, PSK, and QAM Techniques – Bandwidth Utilization: Multiplexing and Spreading - Data Transmission using Telephone Networks – Dial-Up MODEMS.

UNIT III - Data Link Layer

Error Detection and Correction Techniques – Data Link Control: Framing, Flow and Error Control – HDLC and PPP Protocols. Multiple Access Techniques – CSMA, CSMA/CD, CSMA/CA – Channelization – TDMA-FDMA- CDMA

UNIT IV – LAN'S

Wired LAN's– IEEE 802 Standards - Ethernet – IEEE 802.3 MAC Frame – Token Ring LAN - IEEE 802.5 MAC Frame – Wireless LAN's – IEEE 802.11 Standard – Bluetooth Technology – Interconnection of LAN's.

UNIT V - Internetworking

Internetworking – Tunneling – IP Addressing Scheme – Structure of IP Datagram – IP Routing – TCP as Transport Layer Protocol – Structure of TCP Segment – TCP Connection: Establishment and Closing – SMTP Protocol for E-Mail Application.

TEXT BOOKS

1. Data Communications and Networking, Behrouz A. Forouzan , Tata McGraw-Hill, Fourth Edition, 2009
2. Computer Networks: A Systems Approach, Larry L. Peterson and Bruce S. Davie, Elsevier Publications, Fourth Edition, 2007.

REFERENCES

1. Computer Networking, Stanford H. Rowe and Marsha L. Schuh, Pearson Education, First Edition, 2007.
2. Computer Networking: Top Down Approach featuring the Internet, James Kurose and Keith Ross, Pearson Education, Fifth Edition, 2012.

15ECP301	DIGITAL SIGNAL PROCESSING	Semester-III			
		L	T	P	C
		3	1	-	4

COURSE OBJECTIVES

- To understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform.
- To get an exposure on Discrete Fourier Transforms (DFT), its applications and implementation by FFT techniques.
- To apply design technique for FIR type digital filters
- Understand fundamentals of Digital Signal Processing
- Analyze & compare different signal processing strategies.
- Become aware of some applications of DSP.

COURSE OUTCOMES

- Understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform
- Ability to compute various transform analysis of Linear Time Invariant Systems.
- Implement problem solving strategies to DSP Problems.
- Able to test signal processing algorithms for various applications
- Ability to understand Various applications of DSP such as signal processing and telecommunication.
- Apply design techniques for FIR type digital filters

UNIT I - Structures For Discrete Time Systems

Introduction – Block Diagram and Signal Flow Graph Representation of Linear Co-Efficient Difference Equation – Basic Structures for IIR Systems – Basic Network Structures for FIR Systems – Lattice Structures – Zero Input Cycles in Fixed Point Realization of IIR Digital Filters.

UNIT II - Filter Design Techniques

Introduction – Design of Discrete Time IIR Filters from Continuous Time Filters – Frequency Transformation of Low Pass IIR Filters – Design of FIR Filters by Windowing - Comments on IIR and FIR Digital Filters.

UNIT III - Computation of Discrete Fourier Transform

Introduction – Efficient Computation of DFT – Decimation in Time FFT Algorithms – Decimation in Frequency Algorithms – Implementations of FFT Algorithms – FFT Algorithms for Composite N.

UNIT IV - TMS 320 C 6713 Overview

Introduction – TMS320C6713 Overview – Key Features – Architectural Overview – Functional Block Diagram - Internal Memory Organization – CALU – System Control – PLU – Interrupts – Addressing Modes – Instruction Set.

UNIT V - Introduction to MATLAB

Introduction To M-Files – Inline Functions – Control Flow – Relations & Logical Operators – Strings – Cell Arrays – Functions – MATLAB Graphics: - 2d Graphics – 3d Graphics – Animations.

TEXT BOOKS

1. Discrete Time Signal Processing, Oppenheim A.V and Schaffer RW, Buck .C, Prentice Hall India, Second Edition, 2013.
2. Digital Signal Processing – A computer Based Approach, Sanjith K.Mitra, McGraw Hill, Fourth Edition, 2013.
3. TMS 320 C 671x users guide, Texas instruments, 1993.

REFERENCES

1. Digital Signal Processing, Nagoor Kani.A, Tata McGraw Hill Pvt Ltd, Second Edition, 2012.

15ECP302	DIGITAL IMAGE PROCESSING	Semester-III			
		L	T	P	C
		4		-	4

COURSE OBJECTIVES

- To get an exposure on Discrete Fourier Transforms (DFT), its applications and implementation by FFT techniques.
- To understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform.
- To acquire the fundamental concepts of a digital image processing system
- To identify and exploit analogies between the mathematical tools.
- To design and implement with MATLAB algorithms for digital image process.
- Discuss techniques specific to 2D system

COURSE OUTCOMES

- Understand the need for image transforms different types of image transforms and their properties.
- Develop any image processing application.
- Learn different techniques employed for the enhancement of images.
- Learn different causes for image degradation and overview of image restoration techniques.
- Understand the need for image compression and to learn the spatial and frequency
- Apply design techniques for FIR type digital filters

UNIT I - Digital Image Fundamentals

Introduction to Elements of A Digital Image Processing System – Structure of the Human Eye – Image Formation and Contrast Sensitivity – Sampling and Quantization – Neighbors of Pixel – Distance Measure – Photographic Film Structure and Exposure – Film Characteristics – Image Processing Applications.

UNIT II - Image Transforms

Introduction to Fourier Transform – DFT – Properties of Two-Dimensional FT – Separability, Translation, Periodicity, Rotation, Average Value – FFT Algorithm – Walsh Transform – Hadamard Transform – Discrete Cosine Transform.

UNIT III - Image Enhancement

Definition – Spatial Domain Methods – Frequency Domain Methods – Histogram – Modification Techniques – Neighborhood Averaging – Median Filtering – Low Pass Filtering – Averaging of Multiple Images – Image Sharpening by Differentiation and High Pass Filtering.

UNIT IV - Image Encoding

Introduction to Image Encoding - Objective and Subjective Fidelity Criteria – Basic Encoding Process – Mapping – Quantizer – Coder – Encoding – Contour Encoding – Run Length Encoding - Image Encoding – Relative to Fidelity Criterion – Differential Pulse Code Modulation.

UNIT V - Application of Image Processing

Introduction to Image Classification – Image Recognition – Image Understanding – Image Fusion – Image Compression - Colour Image Processing.

TEXT BOOKS

1. Digital Image Processing, Rafael C. Gonzalez, Richard E Woods, Pearson Education, Third Edition, 2014.
2. Fundamentals of Digital Image Processing, Anil K.Jain, Pearson Education, Second Edition, 2010.

REFERENCES

1. Digital Image Processing, S. Sridhar, Oxford University Press, First Edition, 2011

15ECP303	PROGRAMMABLE LOGIC CONTROLLER	Semester-III			
		L	T	P	C
		3	1	-	4

COURSE OBJECTIVES

- To identify logical process control in automation
- To connect PLC peripherals with PLC for logical functioning.
- To get strong knowledge in the developing of basic PLC programs
- To understand the components of a PLC system To understand how PLCs are used
- To understand the H&S requirements of a PLC- controlled system
- To understand different methods of interfacing with a PLC

COURSE OUTCOMES

- Identify the main parts of programmable logic controller
- Develop logic gate circuits for Boolean expressions
- Able to state basic PLC Terminology
- Identify logical process control, in automation.
- Describe how a programmable logic controller is programmed.
- Describe switching elements on input/output modules

UNIT I - Introduction to Programmable Logic Controller

PLC Evolution – Hardwire Control System Compared with PLC System - Advantages of PLC's – Criteria for Selection of Suitable PLC - Block Diagram of PLC – Principle of Operation – CPU – Memory Organization – I/O Modules – Input Types – Logic, Analog – Pulse Train – Expansion Modules – Power Supplies to PLC – Modular PLC's .

UNIT II - Input Modules

Discrete Input Module – AC Input Module – DC Input Module – Sinking and Sourcing – Sensor Input – Special Input Modules – Sensors – Limit Switch, Reed Switch, Photo Electric Sensor, and Inductive Proximity Sensor – Input Addressing Scheme in Important Commercial PLC's.

Output Modules Discrete Output Module – TTL Output Module – Relay Output – Isolated Output Module – Surge Suppression in Output – Analog Outputs – Open Collector Output.

UNIT III - PLC Programming

Symbols Used – Relays and Logic Functions – OR, AND, Comparator - Programming Devices – Programming Methods – STL and CSF, FBD and Ladder Methods – Simple Instructions – Programming NC and NO Contacts - EXAMINE ON and EXAMINE OFF Instructions - Online, Offline Methods – Latch and Unlatch Outputs – Pulse Edge Evaluation – Timer Instructions – ON Delay and OFF-Delay Timer-Counter Instructions – UP / DOWN Counters – Timer and Counter Applications- Program Control Instructions – Data Manipulating Instructions – Math Instructions - Converting Simple Relay Ladder Diagram into PLC Relay Ladder Diagram – PID and PWM Functions.

UNIT IV - Networking

Levels of Industrial Control – Types of Networking – Network Communications – Principles – Transmission Media – Field Bus – Introduction, Concepts, International Field Bus Standards – Networking with TCP / IP Protocol – Network Architecture – Physical Addressing – LAN Technologies – Ethernet – Token Ring – Sub-Netting – Subnet Mask – Transport Layer – Ports – Sockets Network Services – File Transfer Protocol.

UNIT V - Data Acquisition Systems

Computers in Process Control – Data Loggers – Data Acquisition Systems (DAS) – Alarms – Direct Digital Control (DDC) - Characteristics of Digital Data – Controller Software – Computer Process Interface for Data Acquisition and Control –Supervisory Digital Control (SCADA) - Introduction and Brief History of SCADA – SCADA Hardware and Software.

TEXT BOOK

1. Introduction to Programmable Logic Controllers, Gary Dunning, Thomson Delmar Learning, Third Edition, 2007.

REFERENCES

1. Programmable Logic Controllers: Principles and Applications, Webb John W , A, Prentice Hall of India, Fifth Edition, 2009

15ECP304	MOBILE COMPUTING	Semester-III			
		L	T	P	C
		4		-	4

COURSE OBJECTIVES

- To build knowledge on various Mobile Computing algorithms.
- To provide application skills in working with Wireless Application Protocols to develop mobile content applications.
- To explore the characteristics of different types of mobile networks on the performance of a pervasive computing system
- To develop applications that are mobile-device specific and demonstrate current practice in mobile computing
- To have knowledge in the comprehension and appreciation of the design and development of context-aware solutions for mobile devices.
- To enable students to compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.

COURSE OUTCOMES

- Understand fundamentals of wireless communications.
- Know the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.
- Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.
- Demonstrate basic skills for cellular networks design.
- Apply knowledge of TCP/IP extensions for mobile and wireless networking.
- Analyze different parameters of wireless communication techniques

UNIT I -Wireless Communication

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Cellular Wireless Networks.

UNIT II - Satellite Systems and Broadcast Systems

Introduction – Applications – Basics –Routing –Localization – Handover – Examples – Cyclic repetition of data - Digital audio broadcasting - Digital video broadcasting - Convergence of Broadcasting and mobile

UNIT III - Wireless LAN

Infrared vs. Radio Transmission - Infrastructure and Adhoc Network – IEEE 802.11 – HYPERLAN – Bluetooth.

UNIT IV - Mobile Network Layer

Mobile Network layer - Mobile IP – Dynamic Host Configuration Protocol – Mobile Adhoc Networks.

UNIT V - Mobile Transport Layer

Traditional TCP - Classical TCP Improvements – TCP over 2.5/3G Wireless Networks -3G NETWORKS: Introduction-Principles of WCDMA - UMTS Network Architecture and Protocols.

TEXT BOOK

1. Mobile Computing, Hasan Ahmed , Roopa Yavagal , Asoke K, McGraw Hill Education (India) Private Limited, 2nd Edition, 2011

REFERENCES

1. Mobile communications, Jochen Schiller, Pearson Education, New Delhi, Second Edition, 2008.
2. 3G Networks, Architecture, Protocols and Procedures, SumitKasera and NishitNarang, Tata McGraw Hill Professional networks Series, New Delhi, 2008.

15ECP305A	ANALOG VLSI DESIGN	Semester-III			
		L	T	P	C
		4		-	4

COURSE OBJECTIVES

- To learn the fabrication techniques of Integrated Circuits.
- To know the fundamental rules of layout design.
- To design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout
- Importance of CMOS and Mixed Signal VLSI design in the field of Electronics and Telecommunication
- Underlying methodologies for analysis and design of fundamental CMOS Analog and Mixed signal Circuits like Current and Voltage references, Single stage Amplifiers, Operational Amplifiers, Data Converters
- The issues associated with Mixed Signal VLSI Circuits.

COURSE OUTCOMES

- Realize logic circuits with different design styles.
- Understand working principle of operation of different types of memories.
- Familiarize with the fabrication techniques of Integrated Circuits.
- Design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout.
- Express the layout of simple MOS Circuit using Lambda based design rules.
- Design an application using Verilog HDL

UNIT 1 - Device Modeling

Introduction to Analog Design - MOS Device Model- DC, Small Signal and High Frequency Model- Diode Model: DC, Small Signal and High Frequency Model- BJT: DC, Small Signal and High Frequency Model - Measurement of Model Parameters.

UNIT II - Analog Circuit Building Blocks

Switches- Active Resistors- Current Sources and Sinks- Current Mirrors – Simple, Wilson, Cascode- Folded – Cascode - Voltage and Current. References – Band gap Voltage references, Comparators-Multipliers.

UNIT III - Single Stage Amplifiers

MOS and BJT inverting amplifier- Improving the performance of Inverting amplifier - Single stage BJT and MOS amplifiers.

UNIT IV - Multistage Amplifiers

CMOS and BJT differential amplifiers - Darlington Amplifiers - Cascode Amplifiers- Characteristics of Operational amplifiers – Types -Two stage BJT and CMOS - Cascode - Folded Cascode - Transconductance.

UNIT V - Data Converters

Data Converter fundamentals- DAC Architectures- Current Switched-Resistive-Charge redistribution- Hybrid -Segmented D/A Converters - ADC architectures: Flash, Pipeline, Integrating, Successive Approximation and folding A/D Converters - Over sampling Converters

TEXT BOOKS

1. Analog Integrated Circuit Design, David A. Johns, Ken Martin, John Wiley & Sons, Second Edition, 2013.
2. CMOS Circuit Design, Layout and Simulation, Jacob Baker, Harry W.Li and David E Boyce, John Wiley & Sons, Second Edition, 2009.

REFERENCES

1. CMOS Analog Circuit Design, Phillip E. Allen and Douglas R. Holdberg, Oxford University Press, Third Edition, 2013.
2. Design of CMOS Integrated Circuits, Behzad Razavi, Tata McGraw Hill, First Edition, 2008.

15ECP305B	CRYPTOGRAPHY AND NETWORK SECURITY	Semester-III			
		L	T	P	C
		4		-	4

COURSE OBJECTIVES

- To describe and analyze existing authentication protocols.
- To analyze key agreement algorithms to identify their weakness
- To develop knowledge on system level security and misuse of computer security
- Acquire background on well known network security protocols
- Learn fundamentals of cryptography and its application to network security
- Acquire background on hash functions; authentication; firewalls; intrusion• detection techniques

COURSE OUTCOMES

- Understand various Cryptographic Techniques
- Apply various public key cryptography techniques
- Implement Hashing and Digital Signature techniques
- Understand the various Security Applications
- Implement system level security applications
- Understand network security threats, security services, and countermeasures

UNIT I - Introduction

OSI Security Architecture - Classical Encryption Techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation -Evaluation Criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality

UNIT II - Public Key Cryptography

Key Management – Diffie-Hellman Key Exchange – Elliptic Curve Architecture and Cryptography - Introduction To Number Theory – Confidentiality Using Symmetric Encryption – Public Key Cryptography and RSA.

UNIT III - Authentication and Hash Function

Authentication Requirements – Authentication Functions – Message Authentication Code - Hash Functions – Security of Hash Functions and MAC's – MD5 Message Digest Algorithm - Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols.

UNIT IV - Network Security

Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

UNIT V - System Level Security

Intrusion Detection – Password Management – Viruses and Related Threats – Virus Counter

Measures – Firewall Design Principles – Trusted Systems.

TEXT BOOKS

1. Cryptography and Network Security – Principles and Practices, William Stallings, Pearson Education, Sixth Edition, 2013.
2. Cryptography and Network Security, Behrouz A. Foruzan, Tata McGraw-Hill Publications, Second Edition, 2011.

REFERENCES

1. Applied Cryptography, Bruce Schneier, John Wiley & Sons Inc, Second Edition, 2010.
2. Security in Computing, Charles B. P fleeger, Shari Lawrence P fleeger, Pearson Education, Fourth Edition, 2006.

15ECP305C	PRINCIPLES OF ROBOTICS	Semester-III			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To learn the basic configuration of Robotics
- To understand the various types of Robots.
- To get an exposure in Robot control systems
- To acquire the knowledge on advanced algebraic tools for the description of motion
- To develop the ability to analyze and design the motion for articulated systems.
- To develop an ability to use software tools for analysis and design of robotic systems

COURSE OUTCOMES

- Understand the relationship between mechanical structures of industrial robots and their operational workspace characteristics.
- Illustrate the kinematics and dynamics of robotics.
- Implementation of related instrumentation and control in robotics
- Ability to solve inverse kinematics of simple robot manipulators
- Able to do the path planning for a robotic system
- Identify a Robot for a specific application

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 - 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 – Thersholding - Noise Reduction - Edge Detection-Segmentation - Image Analysis and Object Recognition

TEXT BOOKS

1. Introduction to Robotics: Analysis, Control, Applications, Saeed B. Niku, Wiley India Pvt Ltd, Second Edition, 2012.
2. Introduction to Robotics Mechanics and Control, John J. Craig, Tata McGraw Hill Publishing Company Limited. Third Edition, 2008.

REFERENCES

1. Industrial Robotics: Technology, Programming, and Applications, Mikell P Groover, Tata McGraw Hill Publishing Company Limited, Second Edition, 2012.

15ECP305D	MATLAB AND SIMULINK PROGRAMMING	Semester-III			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To introduce the MATLAB for numerical computations to know the basic concepts.
- To familiarize basic commands through the Command window and output through the Graph window
- Introduce the MATLAB software environment
- Apply a variety of common numeric techniques to solve and visualize engineering-related computational problems
- To program scripts and functions using the Matlab development environment.
- To use basic flow controls (if-else, for, while).

COURSE OUTCOMES

- Understand the concept of time response and frequency response of the system
- Use MATLAB effectively to analyze and visualize data
- Apply numeric techniques and computer simulations to solve engineering-related problems
- Apply a top-down, modular, and systematic approach to design, write, test, and debug sequential MATLAB programs to achieve computational objectives
- Design and document computer programs and analyses in a careful and complete manner so as to effectively communicate results,
- Demonstrate understanding and use of fundamental data structures (classes).

UNIT I

MATLAB Basics – Variables - Arrays - Multidimensional Sub Arrays - Special Values - Displaying Output Data-Data Files- Scalar and Array Operations - Hierarchy of Operations -Built-In MATLAB Functions- Introduction to Plotting- Debugging MATLAB Programs.

UNIT II

Branching Statements - Logical Data type - Vectorization.

UNIT III

User-Defined & I/O Functions-Introduction to MATLAB Functions- Variable Passing in MATLAB-Three Optional Arguments- Sharing Data Using Global Memory- Preserving Data Between Calls to a Function- Sub Functions-Private Functions-Nested Functions- Complex Data- String Functions-Text Read Function-Load And Save Commands- MATLAB File Processing-File Opening and Closing- Binary I/O Functions-Formatted I/O Functions- Comparing Formatted and Binary I/O Function- File Positioning and Status Functions.

UNIT IV

Handle Graphics & GUI - Graphics System-Object Handles-Examining and Changing Object Properties- User-Defined Data- Finding Objects- Selecting Objects -Object Properties-Graphical User Interface Components-Dialog Boxes- Menus.

UNIT V

Simulink Basics: Introduction-Simulink Modeling-Solvers- Simulating Model Using Variables from MATLAB-Data Import/Export - State – Space Modeling & Simulation- Creation of Subsystems-Mass Subsystem.

TEXT BOOKS

1. MATLAB programming for Engineers, Stephen J. Chapman, Cengage Learning Fourth Edition, 2014.
2. MATLAB & its Application in Engineering, Rajkumar Bansal, Ashokkumar Good, Manoj kumar Sharma, Person Education. First Edition, 2010.

REFERENCES

1. MATLAB and Simulink – Introduction to Applications, Partha S.Mallick, Scitech Publications, Fourth Edition, 2011.

15ECP305E	NANO ELECTRONICS	Semester-III			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To discuss about the latest technology on nano systems based Nanoelectronics.
- To know the various methods to fabricate and measure Nanoscale features.
- To identify the critical parameters that one must evaluate when considering any new Nanoelectronics device.
- Know the types of nanotechnology, atomic structure, molecular technology and• preparation of nano materials
- Understand the fundamentals of nano electronics and its properties.
- Know the Silicon MOSFET's, QTD and carbon nano tubes

COURSE OUTCOMES

- Understand the fundamentals of Nano Electronics and its properties.
- Gain the concepts of quantum theory.
- Understand the latest technology on nano systems based Nano electronics
- Identify the various methods to fabricate and measure Nanoscale features.
- Evaluate the critical parameters when considering any new Nano electronics device.
- Understand the applications of Nano Electronics

UNIT I - Introduction

The Development of Microelectronics – The Region of Nanoelectronics - The Complexity Problem – The Challenge Initiated by Nanoelectronics. Basics of Nanoelectronics: Electromagnetic Fields and Photons – Quantization of Action, Charge, and Flux – Electrons Behaving as Waves – Electrons in Potential Wells – Diffusion Process.

UNIT II - Biochemical and Quantum-Mechanical Computers

DNA Computer – Information Processing with Chemical Reactions – Nanomachines – Parallel Processing - Quantum Computers – Bit and Q bit – Coherence and Entanglement – Quantum Parallelism.

UNIT III - Parallel Architectures for Nanosystems

Mono and Multiprocessor Systems – Some Considerations to Parallel Processing – Influence of Delay Time – Power Dissipation - Architecture for Processing in Nanosystems: Classic Systolic Arrays – Processor with Large Memory – Processor Array with SIMD and PIP Architectures.

UNIT IV - Soft Computing and Nanoelectronics

Methods of Soft Computing – Fuzzy Systems – Evolutionary Algorithms – Connectionist Systems – Computationally Intelligent Systems – Characteristics of Neural Networks in Nanoelectronics - Local Processing – Distributed and Fault-Tolerant Storage – Self-Organization.

UNIT V - Nanosystems as Information Processing Machines

Nanosystems as Functional Machines – Information Processing as Information Modification – System Design and its Interfaces – Requirements of Nanosystems - Uncertainties: Removal of Uncertainties by Nanomachines – Uncertainties in Nanosystems – Uncertainties in the development of Nanoelectronics.

TEXT BOOK

1. Basics of Nano Electronics**,** G. P. Singh**,** Animol Publications Pvt. Ltd., First Edition,2011

REFERENCES

1. Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum devices, Karl Goser Springer, New Delhi, First Edition, 2005.

15ECP311	PRACTICAL – V DIGITAL SIGNAL PROCESSING LAB	Semester-III			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- To implement Linear and Circular Convolution
- To implement FIR and IIR filters
- Familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors.
- Aware about implications of the properties of systems and signals
- To design FIR filters and IIR Filters
- Analyze discrete-time filter banks and multi-rate signal processing system

COURSE OUTCOMES

- Analyze the CMOS layout levels, how the design layers are used in the process sequence, and
- Understand the handling of discrete/digital signals using MATLAB
- Understand the basic operations of Signal processing
- Analyze the spectral parameter of window functions
- Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters
- Design the signal processing algorithm using MATLAB

(Any 10 Experiments)

USING TMS320C5X/TMS320C54XX/TMS320C67XX/MATLAB

1. Study of addressing Modes of DSP using simple examples
2. Arithmetic operations
3. DFT computations
4. FFT Computations
5. Convolution of two discrete signals
6. Correlation of two discrete signals
7. Quantization noise
8. Waveform generation
9. FIR Filter design
10. IIR filter design
11. Discrete Cosine Transform
12. Kalman filter

15ECP312	PRACTICAL – VI DIGITAL IMAGE PROCESSING LAB	Semester-III			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- To get an exposure on Discrete Fourier Transforms (DFT), its applications and implementation by FFT techniques.
- To understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform.
- To acquire the fundamental concepts of a digital image processing system
- To identify and exploit analogies between the mathematical tools.
- To design and implement with MATLAB algorithms for digital image process.
- To treat the 2D systems as an extension of 1D system design
- Discuss techniques specific to 2D system

COURSE OUTCOMES

- Understand the need for image transforms different types of image transforms and their properties.
- Develop any image processing application.
- Learn different techniques employed for the enhancement of images.
- Learn different causes for image degradation and overview of image restoration techniques.
- Understand the need for image compression and to learn the spatial and frequency
- Apply design techniques for FIR type digital filters

(Any 10 Experiments)

1. Generation of Signals
2. Amplitude Modulation & FFT response
3. Impulse, Step, Exponential & Ramp functions
4. Frequency sampling method
5. Image Sampling – Zooming & Shrinking Operations
6. Basic Gray Level Transformations: Image Negative, Power law and log transforms
7. 2-D Discrete Fourier Transform
8. Walsh Transform
9. Image Contrast Enhancement by Histogram Equalization Technique
10. Spatial Image Filtering: Low pass and high pass filtering
11. 2-D Wavelet Transform
12. Image Compression.

15ECP306	ANALYSIS AND DESIGN OF ANALOG INTEGRATED CIRCUITS	Semester-III			
		L	T	P	C
		-	-	-	4

COURSE OBJECTIVES

- To develop an in-depth knowledge on IC fabrication technology
- To understand the basic concepts of operational amplifier and its various applications
- To understand the basics of PLL and its practical applications
- To know about analog multipliers
- To know about various analog switches and different A/D and D/A convertors
- To understand the concepts of switched capacitor filters,Voltage regulator and various• amplifiers

COURSE OUTCOMES

- Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems
- Develop skills to design simple circuits using OP-AMP
- Gain knowledge about various multiplier circuits, modulators and demodulators
- Gain knowledge about PL
- Learn about various techniques to develop A/D and D/A convertors
- Develop skills to develop simple filter circuits and various amplifiers and can solve problems related to it.

UNIT I - Single Stage Amplifiers

Common Source Stage-Source Follower-Common Gate Stage-Cascade Stage-Single Ended and Differential Operation-Basic Differential Pair-Differential Pair with MOS Loads.

UNIT II - Frequency Response and Noise Analysis

Miller Effect - Association of Poles With Nodes - Frequency Response of Common Source Stage - Source Followers - Common Gate Stage - Cascode Stage - Differential Pair - Statistical Characteristics of Noise - Noise in Single Stage Amplifiers - Noise in Differential Amplifiers.

UNIT III - Operational Amplifiers

Concept of Negative Feedback- Effect of Loading in Feedback Networks-Operational Amplifier Performance Parameters- One-Stage Op Amps- Two-Stage Op Amps- Input Range Limitations-Gain Boosting- Slew Rate- Power Supply Rejection- Noise in Op Amp's.

UNIT IV - Stability and Frequency Compensation

General Considerations- Multipole Systems - Phase Margin - Frequency Compensation - Compensation of Two Stage Op-Amps - Slewing In Two Stage Op- Amps - Other Compensation Techniques.

UNIT V - Biasing Circuits

Basic Current Mirrors- Cascode Current Mirrors- Active Current Mirrors- Voltage References- Supply Independent Biasing- Temperature Independent References- PTAT Current Generation- Constant-Gm Biasing.

TEXT BOOK

1. Analysis and Design of Analog Integrated Circuits, Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, Robert G. Meyer, Wiley India Pvt Ltd, Fifth Edition, 2010.

REFERENCES

1. Analog Integrated Circuit Design, David A. Johns, Ken Martin, John Wiley & Sons, Second Edition, 2013.
2. CMOS Circuit Design, Layout and Simulation, Jacob Baker, Harry W.Li and David E Boyce, John Wiley & Sons, Second Edition, 2009.

15ECP401	HIGH PERFORMANCE COMMUNICATION NETWORKS	Semester-III			
		L	T	P	C
		-	-	-	4

COURSE OBJECTIVES

- To develop a comprehensive understanding of multimedia networking.
- To know the various types of Networks.
- To provide strong knowledge in ultra wideband networks and other types of UWB.
- To have knowledge on broadband networks, ATM networks and high performance networks.
- Understand the overview of Communication Networks, Network Services and layered Architecture.
- Understand the ATM and Wireless Networks.

COURSE OUTCOMES

- Know the communication networks principles and future networks.
- Know the network services and layered architectures.
- Explain the wireless networks, Internet and different protocols.
- Understand the circuit switched networks and ATM.
- Apply the concepts of Random Process to the design of Communication systems
- Gain knowledge in sampling and quantization

UNIT I - Introduction

Networking Principles - Digitalization Service and Layered Architecture - Traffic Characterization and QOS - Network Services - Network Elements - Network Monitoring - Network Control-Network Mechanisms - Network Element Management

UNIT II - Broadband Networks

Introduction – Multi-hop Wireless Broadband Networks-Mesh Networks - Importance of Routing Protocols - Routing Metrics - Packet Scheduling-Admission Control - Classification of Routing - Protocols - MANET Routing Protocols .

UNIT III - IP Networks

Technology Trends in IP Networks- Internet Protocol- IP Packet Communications in Mobile Communication Networks -TCP and VDP- Performance of TCP/IP Networks- Circuits Switched Networks- SONET-DWDM-DSL-Intelligent Network (IN) Scheme-Comparison with Conventional Systems -Merits of the IN Scheme -CATV.

UNIT IV - ATM Networks

Introduction to ATM- Reference Model - ATM Layer- ATM Adaptation Layer (AAL) - AAL1 - AAL2 - AAL3/4 - AAL5 -Traffic Classes - Traffic Management and Quality of Service - Traffic Descriptor - Traffic Shaping-ABR and Traffic Congestion -Network Management - Layer Management- ATM Signaling-ATM Addressing Format-Connection Establishment - IP/ATM

Internetworking - IP Multicast over ATM

UNIT V - High Performance Networking With WIMAX and Ultra Wideband (WPAN)

Introduction - WIMAX Overview - Competing Technologies - Overview of The Physical Layer - PMP Mode - Mesh Mode -Multihop Relay Mode- Introduction- Time-Hopping Ultra wideband - Direct Sequence Ultra wideband – Multiband- Other Types Of UWB.

TEXT BOOK

1. High Performance Communication Networks, Jean warland and Pravin Varaiya, , Morgan Kanffman Publishers, London, 2nd Edition ,2010.

REFERENCES

1. ATM Networks, Sumit Kasera and Pankaj Sethi, Tata McGraw Hill Publications, Second Edition, 2005.