20ECTM01: ANALOG AND DIGITAL COMMUNICATION

Credits - 3 **Sessional Marks: 30**

L: T: P::2:1:0 **University Exam Marks: 70**

Course Objectives

1. The fundamentals of basic communication system, types of noise affecting communication system and noise parameters.
2. Need for modulation, amplitude, frequency modulation and demodulation techniques.
3. Generation and detection of pulse modulation techniques and multiplexing.
4. To design digital communication systems.
5. To evaluate the performance of spread spectrum modulation techniques.

Course Outcomes

After successful completion of the course the student should be able to

CO1. Analyse and compare different analog modulation schemes for their efficiency and bandwidth.

CO2.Understand different frequency and phase modulations and comparing theirefficiencies with amplitude modulations.

CO3. Evaluate various AM and FM transmitters and Receivers.

CO4.Interpret the fundamentals of digital communications and demonstrate generation and reconstruction of different Pulse Code Modulation schemes like PCM, DPCM etc.

Interpret the behaviour of a communication system in presence of noise.

CO5. Demonstratethe generation and reconstruction of various passband techniques.

UNIT I

Review of signals and systems, Frequency domain representation of signals, Elements of Electrical communication systems – Modulation and its needs and types – Fundamental physical limitations – Electromagnetic spectrum and Areas of Applications. Amplitude modulation – Full AM, DSBSC and SSB – Generation and detection methods – VSB – Frequency translation – FDM – Nonlinear distortion and inter modulation.

UNIT II

Angle modulation – Phase and frequency modulation – NBFM – WBFM – Multitone FM – Transmission Bandwidth of FM – Direct and indirect generation of FM – Demodulation methods – Nonlinear effects – FM Versus AM.

UNIT III

Pulse analog modulation – TDM,types of pulse modulation-PAM,PWM,PPM,Generation and demodulation of PAM,PWM and PPM,TDM.

UNIT IV

Pulse Digital Modulation: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization and coding, Quantization error, companding in PCM systems. Differential PCM Systems (DPCM).

Delta Modulation: Delta Modulation, its drawbacks, adaptive delta modulation, comparison of PCM and delta and adaptive delta modulation, noise in PCM and DM systems.

UNIT V

Digital Modulation Techniques: Introduction, BPSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, QASK, BFSK, M-ary FSK, MSK, Duobinary Encoding, Comparison of digital modulation techniques, Partial response signalling.

Text Books

1. Simon Haykin,"Communication Systems",4th Edition,Wiley& sons.
2. H.Taub&D.Schilling,Gautamsahe, "Principle of Communication Systems",3rd Edition,TMH,2007.

Reference Books

1. K.Sam Shanmugam,"Analog and Digital Communication" Wiley,2005.
2. B.P. Lathi and ZhiDing,"Modern Digital and Analog Communication Systems,"4th Edition.

Course Outcomes-Program Outcomes -Program Specific Outcomes(CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L	L					L	L	L		H		
CO2	H	M	L	M					L	L	L			M	H
CO3	L		M	H										M	H
CO4	M	H	L						L	L	L			M	H
CO5	H	M	L	L					L	L	L			M	H

20ECTM02: VLSI SIGNAL PROCESSING

Credits – 4 **Sessional Marks:30**
L:T:P::3: 1 :0 **University Exam Marks:70**

CourseObjectives:

1. Understand the fundamentals of signals and systems for processing the signals
2. Familiarize with the signal processing techniques
3. Know about the basics of DFT techniques
4. Learn about the VLSI design.
5. Apply the signal processing in VLSI

Outcomes:

After successful completion of the course the students should be able to

CO1: Explore different aspect of signlas and systems
CO2: Applyadvancetechniques of signal Processing
CO3: Appl y various types of DFT techniques
CO4: Able to do the CMOS fabrication
CO5: Design and fabricate signal processing VLSI circuits.

UNIT–I:

SIGNAL ANALYSIS: Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT–II

INTRODUCTION TO DIGITAL SIGNAL PROCESSING: Discrete time signals & systems, linear shift invariant systems, stability and causality, Discrete time systems described by difference equations, Frequency domain representation of discrete time signals and systems.

UNIT–III

FOURIER SERIES AND FOURIER TRANSFORMS: Discrete Fourier series representation of periodic sequences, Properties of discrete Fourier series, Discrete Fourier transforms: frequency domain sampling, , linear convolution of sequences using DFT, Computation of DFT, Relationship of DFT to other transforms, Properties of DFT, Fast Fourier transforms (FFT) - Radix-2 FFT algorithm, Radix-4 FFT algorithms, Inverse FFT.

UNIT:IV

VLSI BASICS: CMOS fabrication, p-well process, n-well process, twin-tub process, Bi-CMOS fabrication, MOS transistor, Structure of the transistor, Simple transistor model, Design rules, Fabrication errors, Scalable design rules, SCOMS design rules, Layout design and tools, Layout for circuits, Stick diagrams, Hierarchical stick diagrams.

UNIT :V

Pipelining and Parallel Processing: Pipelining and parallel processing of FIR digital filters, pipeline interleaving in digital filters: signal and multichannel interleaving

Fast Convolution, Filters and Transforms: Cook-toom algorithm, modified cooktoom algorithm, winograd algorithm, iterated convolution Algorithm strength reduction in filters and transforms

Text books

1. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
3. Wayne wolf, "Modern VLSI Design", Pearson Education Asia
4. Dougles A. Pucnell and KarmaranEshraghian, "Basic VLSI Design". Prentice – Hall of India Private Limited.

Course Outcomes-Program Outcomes-Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M												H	M	L
CO2			L		H								M	M	
CO3	M	M		H									H	M	L
CO4					M								M	M	
CO5													H	L	

20ECTM03-IC APPLICATIONS

Credits - 3 **Sessional Marks: 30**

L: T: P:: 2:1:0 **University Exam Marks: 70**

Course Objectives

1. To understand the concepts,working principles and key applications of Linear Integrated circuits
2. To perform analysis of circuits based on Linear Integrated circuits
3. To design circuits and systems for particular applications using Linear Integrated circuits

Course Outcomes

After successful completion of the course the student should be able to

CO1.Understand the fundamental concepts of Differential amplifiers and op-amp.

CO2.Understand the Applications of Op-Amp.

CO3.Design different types of Active filters and waveform generators.

CO4.Use the 555 Timer circuits and Phased Locked Loop for various applications.

CO5.Evaluate the performance of ADCs and DACs.

UNIT I

Operational Amplifier:Differential Amplifier and its transfer characteristic,Classification of ICs,Ideal and practical op-amp characteristics,Internal circuit, DC and AC characteristics, Inverting and non-inverting modes of operation, DC and AC amplifiers, Voltage follower.

UNIT II

Op-Amp Linearapplications: Difference Amplifier, Summer, Integrator, Differentiator, Analog computations, Instrumentation amplifier, V to I and I to V converters, Precision rectifiers, Log and Antilog amplifiers.

Op-AmpNon Linear applications Comparator, Regenerative comparator, Astable and mono stable multi vibrators using op-amp, Traingular wave generator, RC Oscillators using Op-Amp.

UNIT III

Timer and Phase Locked Loop: Introduction to 555 timer, Functional diagram, Monostable and Astable operations and Applications, Schmitt Trigger, Basic Principles of PLL, Lock and capture range, IC PLL (565), PLL applications. VCO 566.

UNIT IV

Combinational logic circuits: Review of Binary, Standard forms of logical functions, minterm and maxterm specifications, simplification by K-maps and Tabular methods, and realization of logical functions using gates. Decoders and encoders, Multiplexers and demultiplexers, Digital Magnitude Comparator

UNITV

D-A &A-D Converters: Introduction,basic DAC Techniques: Weighted resistor DAC,R-2R ladder DAC , Inverted R-2R DAC, Different Types of ADCs: Parallel comparator type,Countertype,successive Approximation , and Dual slope ADCs, DAC and ADC specifications.

Text Books

1. D. Roy Choudary, Shail B. Jain, “linear Integrated circuits”, New Age International Publishers, 2003
2. David A. Bell, “ Operational Amplifiers and Linear ICs”, PHI.

Reference Books

1. J. Michael Jacob, "Applications and Design with Analog integrated circuits", PHI, EEE, 1993.
2. Ramakant A. Gayakwad, "Op-amps and Linear Integrated Circuits", LPE 4th edition, Pearson Education.

Course Outcomes-Program Outcomes -Program Specific Outcomes(CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M	L						L	L	L		H		
CO2	H	M	L						L	L	L		H		
CO3		H	M		M				L	L	L		H	M	
CO4		L	H	M									L	M	H
CO5	H	M	M	L									L	M	H

Ms. K. Prasanthi
Coordinator (ECE)

Dr. P. Satyanarayana
Professor (ECE)

Dr. Ramakrishna Sai Gorthi
BoS Chairman (ECE)

Dr. A. Ramakrishna Rao
Director, SE&T

20MECTM04: EMBEDDED SYSTEMS

Credits - 3 **Sessional Marks: 30**

L: T: P: 3:0:0 **University Exam Marks: 70**

Course Objectives

Students completing this course will be well positioned to

1.Familiarize about the basic functions of embedded systems.
2.Inculcate the basic architecture of general-purpose processors and its applications.
3.Gain interface between analog and digital blocks, also Software aspects of embedded systems.
4.Develop different State Machine and Concurrent Process Models.
5.Learn Evolution of complication and synthesis,Verification and reuse of intellectual property cores.

Course Outcomes

At the end of this course students will demonstrate the ability to

CO1. To understand the embedded system concepts and technologies of embedded systems.
CO2.To analyze the general process of embedded system development.
CO3.To apply Interfacing between analog and digital blocks and apply Software aspects of embedded systems.
CO4.To create finite state machines and analyze Communication and Synchronization among processes.
CO5.To remember evolution and verification of hardware/software co-simulation.

UNIT I

Introduction The concept of embedded systems design, Examples of embedded systems Design challenge, Processor technology, IC technology, Design technology. RT-Level combinational logic, Sequential logic (RT-Level), Custom single purpose processor design (RT-Level), Optimizing custom single purpose processors.

UNIT II

General Purpose Processors Basic architecture, Development environment, Application specific system depth, Set processors (ASIPs).EmbeddedMemories,

UNIT III

Technological aspects of embedded systems Interfacing between analog and digital blocks, signal conditioning, digital signal processing. system interfacing, interfacing with external systems, user interfacing. Design tradeoffs due toprocess compatibility, thermal considerations, etc., Software aspects of embedded systems: realtime programming languages and operating systems for embedded systems.

UNIT IV

State Machine and Concurrent Process Models Introduction, Models Vs languages, Finite State Machine with Data path model (FSMD), Using State Machines, Program State Machine (PSM),Concurrent Process Model, Concurrent Processes, Communication among processors, Synchronization among processes, Implementation, Data flow model.

UNIT V

Introduction Automation The parallel evolution of complication and synthesis, Logic, RT, Behavioral synthesis, System synthesis and hardware/software code sign, Verification of hardware/software co-simulation, Reuse of intellectual property cores,Embedded microcontroller cores.

Text Books

1.Embedded Systems Design – A unified Hardware/Software introduction by Frank Vahid, Tony D. Givargis, John Wiley & Sons. Inc. 2002.

2.J.W. Valvano, "Embedded Microcomputer System: Real Time Interfacing", Brooks/Cole, 2000.

Reference books

1. Jack Ganssle, "The Art of Designing Embedded Systems", Newness, 1999.

2. V.K. Madisetti, "VLSI Digital Signal Processing", IEEE Press (NY, USA), 1995.

3. David Simon, "An Embedded Software Primer", Addison Wesley, 2000.

Course Outcomes-Program Outcomes -Program Specific Outcomes-(CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3
CO1	H		L				H		
CO2	L	M	H	M	L			M	H
CO3				M	H		L	M	H
CO4		L	M	H				L	H
CO5			M	L		H	L	H	M

20ECTM05 - CELLULAR MOBILE COMMUNICATION

Credits - 3 **Sessional Marks: 30**

L: T: P: 3:0:0 **University Exam Marks: 70**

COURSE OBJECTIVES:

1. To know the evolution of Mobile communication and cell concept to improve capacity of the system.
2. To know the fading mechanism and types of fading and effect of fading on Mobile communication.
3. To know the role of equalization in Mobile communication and to study different types of Equalizers and Diversity techniques.
4. To know the types of channel coding techniques, data transmission modes and services of GSM.
5. To know the types of channel coding techniques, data transmission modes and services of CDMA.

COURSE OUTCOMES:

1. After successful completion of the course, the students are able to
2. Demonstrate knowledge on : cellular concepts like frequency reuse, fading, equalization, GSM,CDMA
3. Demonstrate knowledge hand-off and infertace and apply the concept to calculate link budget using
4. path loss model
5. Demonstrate knowledge equalization and different diversity techniques.
6. Apply the concept of GSM in real time applications.
7. Compare different multiple access techniques in mobile communication.

UNIT – I

Introduction to Cellular Mobile Systems: Cellular system and its techniques, Performance criteria, Uniqueness of mobile radio environment, Analog and Digital cellular systems, Frequency reuse channels, channel interference, reduction factors, C/I: for a normal and omni-directional antenna system, Cell splitting, components of cellular system, Cell site antennas and Mobile antennas.

UNIT – II

Cell Coverage for Signal and Traffic: General introduction, Obtaining the mobile point-to-point mobile, Propagation over water or flat open area, Foliage loss, Propagation in near in distance, Long distance propagation, Point to Point prediction model characteristics, Cell site antenna height and signal coverage cells, Mobile to Mobile propagation.

UNIT – III

Interference: Introduction to channel interference, Real-time co-channel interference measurement, Design of antenna system, Diversity receiver, Types of non-co-channel interference, Interference between systems.

UNIT – IV

Frequency Management and Channel Assignment: Frequency spectrum utilization, setup channels, Management, Traffic and Channel assignment handoff and their characteristics, Dropped call rates and their evolution.

UNIT – V

Digital Cellular System: Digital mobile telephony, Multiple Access Systems: FDMA, TDMA, CDMA, Practical multiple access schemes, Global System for mobile (GSM), Miscellaneous mobile systems.

Text Books:

1. Lee, W. C. Y – Mobile Cellular Telecommunication – Analog and Digital Systems, Mc Graw Hill.
2. Rappaport, T. S., "Wireless Communications", Pearson Education, 2003.
3. Andreas. F. Molisch, "Wireless Communications", John Wiley – India, 2006.

Reference Books:

1. Principles of Mobile Communication- Gordon L. Stuber, Springer International, 2nd edition, 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher, Pearson Education, 2005.
3. Wireless Communication Theory and Techniques, Asrar U. H. Sheikh, Springer, 2004.

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		H		L	H			L					H			L
CO2	M	M		L	H	L							M			L
CO3		M			H	M							M			L
CO4		M	H		H								M			L