ANNAMALAI UNIVERSITY

Faculty of Engineering and Technology

Department of Electronics and Communication Engineering

M.E. (COMMUNICATION SYSTEMS)

Full Time - Degree Programme

Revised Regulations & Syllabi

(Students Admitted From the Academic Year 2019-2020)

VISION

To provide innovative, creative and technically competent Electronic and Communication Engineers for industry and society through excellence in Technical Education and Research.

MISSION

M1 To provide quality education in the field of Electronics and Communication Engineering through periodically updating curriculum, effective teaching-learning process, best laboratory facilities and collaborative ventures with the industries.

M2 To inculcate innovative skills, research aptitude, team-work, ethical practices among students so as to meet out expectations of the industry as well as society.

M3 To adopt the best educational methods to improve teaching learning process continuously.

M4 To provide students with hands on training on latest technology with supporting software.

M5 To facilitate effective interactions among faculty and students, and foster networking with alumni, industries and other reputed institutions.

M.E.(CS)-PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

S.No.	PROGRAMME EDUCATIONAL OBJECTIVES
PEO1	To demonstrate their exceptional skills that will enable them to integrate undergraduate fundamentals with advanced knowledge necessary to evaluate and analyze recent developments in the field of communication and network systems
PEO2	To enable the graduates to apply the sustained learning, their engineering skills and adapting to multidisciplinary situations through graduate work, professional development, and self-study in communication system design to meet out the challenges in industries and academia.
PEO3	To engage graduates in research and development in Industry and Academia, adapt emerging technology and pursue Applied Research and innovation in the various domains of communication system.

M.E.(CS)- PROGRAMME OUTCOMES (POs)

S.No	PROGRAMME OUTCOMES
PO1	**Engineering knowledge**: Apply the knowledge of Electronics and Communication Engineering fundamentals to identify, formulate, and present solutions to technical problems in their field of expertise.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using the concepts of that required advanced knowledge within the field.
PO3	**Design / development of solutions**: Design solutions for Communication Systems related engineering problems and design system components or processes that meet the desired specifications.
PO4	**Conduct investigations**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering tools including prediction and modeling to Communication Systems analysis activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge and impact of Communication Systems and engineering solutions to the society and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the sustainability of designed Communication systems with respect to environmental and social issues by their knowledge of contemporary issues in their expertise.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the communication engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate professionally and technically on complex engineering activities with their peer engineering community and society in an effective way, such as, being able to comprehend effective reports and design documentation, make effective presentations, and make and execute clear instructions.

PO11	**Project management and finance**: Demonstrate the knowledge and understanding of the engineering principles by applying the gained knowledge, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need, adapt themselves for the preparation and ability to engage in independent life-long learning wholly to the demands of the Communication and technological change.

MAPPING OF PEO WITH PO												
PEOs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
PEO1	✓				✓	✓			✓			
PEO2		✓	✓	✓					✓	✓		
PEO3	✓	✓		✓		✓	✓				✓	✓

M.E. (COMMUNICATION SYSTEMS) FULL TIME - DEGREE PROGRAMME
CURRICULUM - 2019

SEMESTER I									
Course Code	**Category**	**Course**	**L**	**T**	**P**	**CA**	**FE**	**Total**	**Credits**
ECCSPC11	**PC I**	Advanced Digital Communication Techniques	3	-	-	25	75	100	3
ECCSPC12	**PC II**	Advanced Digital Signal Processing	3	-	-	25	75	100	3
ECCSPE13	**PE I**	Program Elective-I	3	-	-	25	75	100	3
ECCSPE14	**PE II**	Program Elective-II	3	-	-	25	75	100	3
ECCSMC15	**MC**	Research Methodology and IPR	2	-	-	25	75	100	2
ECCSCP16	**CP I**	Advanced Digital Communication Techniques Lab	-	-	3	40	60	100	2
ECCSCP17	**CP II**	Advanced Digital Signal Processing Lab	-	-	3	40	60	100	2
ECCSAC18	**AC I**	Audit Course-I	2	-	-	-	-	-	0
							Total		**18**

SEMESTER II									
Course Code	**Category**	**Course**	**L**	**T**	**P**	**CA**	**FE**	**Total**	**Credits**
ECCSPC21	**PC III**	Advanced Radiation Systems	3	-	-	25	75	100	3
ECCSPC22	**PC IV**	Advanced Wireless Communication Engineering	3	-	-	25	75	100	3
ECCSPE23	**PE III**	Program Elective-III	3	-	-	25	75	100	3
ECCSPE24	**PE IV**	Program Elective-IV	3	-	-	25	75	100	3
ECCSOE25	**OE I**	Open Elective	3	-	-	25	75	100	3
ECCSCP26	**CP III**	Advanced Radiation Systems Lab	-	-	3	40	60	100	2
ECCSTS27	**TS**	Industrial Training and Seminar / Mini Project		Tr 2	S 2	40	60	100	2
ECCSAC28	**AC II**	Audit Course-II	2	-	-	-	-	-	0
							Total		**19**

PC	Program Core	**CP**	Core Practical	**AC**	Audit Course
PE	Program Elective	**TS**	Industrial Training and Seminar	**PV**	Project work & Viva-voce
OE	Open Elective	**MC**	Mandatory Learning Course	**EC**	Branch code
				CS	M.E Specialization Code

SEMESTER III									
Course Code	**Category**	**Course**	**L**	**T**	**P**	**CA**	**FE**	**Total**	**Credits**
ECCSPE31	**PE V**	Program Elective-V	3	-	-	25	75	100	3
ECCSOE32	**OE II**	Open Elective	3	-	-	25	75	100	3
ECCSPV33	**PV-I**	Project work & Viva-voce Phase-I	-	Pr 16	S 4	40	60	100	10
							Total		**16**

SEMESTER IV									
Course Code	**Category**	**Course**	**L**	**T**	**P**	**CA**	**FE**	**Total**	**Credits**
ECCSPV41	**PV-II**	Project work & Viva-voce Phase-II	-	Pr 24	S 6	40	60	100	15
							Total		**15**

Sl. No.	COURSE CODE	LIST OF PROGRAM ELECTIVES	Credits
1	ECCSPESC	RF Engineering	3
2	ECCSPESC	Optical Networks	3
3	ECCSPESC	Wireless Sensor Networks	3
4	ECCSPESC	Speech Processing	3
5	ECCSPESC	Spread Spectrum Communication	3
6	ECCSPESC	Microwave Antenna and Integrated Circuits	3
7	ECCSPESC	RF MEMS for Wireless Communication	3
8	ECCSPESC	OFDM for Wireless Communication	3
9	ECCSPESC	Mobile Ad Hoc Networks	3
10	ECCSPESC	High Speed Networks	3
11	ECCSPESC	Virtual Private Networks	3
12	ECCSPESC	Electromagnetic Interference and Compatibility	3
13	ECCSPESC	Advanced Electromagnetic Theory	3
14	ECCSPESC	RF Communication	3
15	ECCSPESC	Advanced Digital Image Processing	3

16	ECCSPESC	Digital Video Processing	3
17	ECCSPESC	Wireless Communication Network	3
18	ECCSPESC	VLSI for Wireless Communication	3
19	ECCSPESC	FPGA based Wireless Communication System Design	3
20	ECCSPESC	Error Control Coding	3

Sl. No.	COURSE CODE	LIST OF OPEN ELECTIVES	Credits
1	ECCSOESC	Business Analytics	3
2	ECCSOESC	Industrial Safety	3
3	ECCSOESC	Operations Research	3
4	ECCSOESC	Cost Management of Engineering Projects	3
5	ECCSOESC	Composite Materials	3
6	ECCSOESC	Waste to Energy	3
7	ECCSOESC	Wireless Intelligent Networks	3
8	ECCSOESC	System Management and Security	3
9	ECCSOESC	Embedded System Design	3
10	ECCSOESC	Multimedia Communication	3
11	ECCSOESC	Soft Computing Techniques	3
12	ECCSOESC	Cloud Computing	3
13	ECCSOESC	Bio Signal Processing	3
14	ECCSOESC	Cryptography Systems	3

Sl. No.	COURSE CODE	LIST OF AUDIT COURSE
1	ECCSACSC	English for Research Paper Writing
2	ECCSACSC	Disaster Management
3	ECCSACSC	Sanskrit for Technical Knowledge
4	ECCSACSC	Value Education
5	ECCSACSC	Constitution of India
6	ECCSACSC	Pedagogy Studies
7	ECCSACSC	Stress Management by Yoga
8	ECCSACSC	Personality Development through Life Enlightenment Skills

ECCSPC11	ADVANCED DIGITAL COMMUNICATION TECHNIQUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To enable the student to understand advanced modulation and Coding Techniques.
- To learn the Optimum receivers for digital communication schemes.
- To have a knowledge on base band signal conditioning methods for exploiting the channel.
- To provide in-depth treatment on methods and techniques in Turbo Coding
- To study the fundamentals of equalization

Digital Modulation Techniques

Digital Modulation, an Overview, Factors that Influence the Choice of Digital Modulation, Bandwidth and Power Spectral Density of Digital Signals, Line Coding and Pulse Shaping Techniques, Linear Modulation Techniques: BPSK, DPSK, QPSK, Offset QPSK, π /4 QPSK, QPSK Transmission and Detection Techniques, Combined Linear and Constant Envelope Modulation: MPSK, QAM, MFSK and OFDM, Spectral Characteristics of Digitally Modulated Signals.

Optimum Receivers

Optimum Receiver for Signals Corrupted by Additive White Gaussian Noise, Performance of the Optimum Receiver for Memory less, Modulation Optimum Receiver for CPM Signals, Optimum Receiver for Signals with Random Phase in AWGN Channel, Performance Analysis for Wire line and Radio Communication Systems,

Modulation Performance in Fading and Multipath Channels: Performance of Digital Modulation in Slow Flat Fading Channels, Frequency Selective Channels, Performance of π/4 DQPSK in Fading and Interference.

Equalization

Fundamentals of Equalization, Generic Adaptive Equalizer, Equalizers in Communication Receivers, Survey of Equalization Techniques, Linear Transversal and Filter Equalizer, Non Linear Equalizers: Decision Feedback and Maximum Likelihood Sequence Equalizer, Algorithms for adaptive Equalization, Fractional Spaced Equalizers.

Trellis Coded Modulation

Modulation and Coding for Band Limited Channels, Coded Modulation for Bandwidth-Constrained Channels-Trellis Coded Modulation; Set Partitioning, Four –State Trellis Coded Modulation with 8-PSK Signal Constellation, Eight-State Trellis Code for Coded 8-PSK Modulation, Eight-State Trellis for Rectangular QAM Signal Constellations, Decoding Methods.

Turbo Coding

Introduction-Turbo Encoder, Turbo Decoder, Iterative Turbo Decoding Principles; Modifications of the MAP Algorithm-The Soft-Output Viterbi Algorithm (SOVA); Turbo Coded BPSK Performance over Gaussian channels, Turbo Coding Performance over Rayleigh Channels.

REFERENCES

1. Theodore S.Rappaport., “Wireless Communications”, 2nd edition, Pearson Education, 2002.
2. John G. Proakis., “Digital Communication”, 4th edition, Mc Graw Hill Publication, 2001
3. Bernard Sklar., “Digital Communications”, 2nd edition, Pearson Education, 2001.

4. Stephen G. Wilson., "Digital Modulation and Coding", First Indian Reprint, Pearson Education, 2003.
5. M.K.Simon, S.M.Hinedi and W.C.Lindsey, "Digital communication techniques; Signalling and detection", Prentice Hall India, New Delhi, 1995.

COURSE OUTCOMES

The student would be able

1. To demonstrate various digital modulation techniques
2. To design basic and advanced coding for a digital communication system
3. To use base band signal conditioning methods involved for exploiting channel.
4. To Understand clearly about equalization fundamentals
5. To Understand the basic concepts and characteristics of Turbo Coding

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes (COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓	✓		✓				✓			
CO2			✓	✓	✓	✓		✓			✓	
CO3	✓	✓	✓	✓		✓						
CO4	✓			✓						✓		
CO5	✓	✓	✓	✓			✓					✓

ECCSPC12	**ADVANCED DIGITAL SIGNAL PROCESSING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To provide in-depth treatment on methods and techniques in discrete-time signal transforms, digital filter design, optimal filtering power spectrum estimation, multi-rate digital signal processing.
- To estimate the spectrum using parametric methods and non parametric methods and prediction using wiener FIR & IIR filters.
- To study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
- To apply multirate signal processing fundamentals.
- To learn about wavelet transform

Discrete Random Signal Processing

Discrete Random Processes, Expectations, variance, Co-variance, energy of discrete signals – Parseval's theorem. Wiener Khintchine relation – Power spectral density –Periodogram- Sample autocorrelation-sum decomposition theorem, spectral factorization theorem – Discrete random signal processing by linear systems – Simulations of white noise.

Spectrum Estimation

Non-parametric methods-correlation method- co-variance estimator – performance analysis of estimators-unbiased, consistent estimators- Periodogram Estimator – Barlett spectrum estimation – Welch estimation – Model based approach- AR, MA, ARMA Signal Modeling – Parameter estimation using Yule-Walker method.

Linear Estimation and Prediction

Maximum likelihood criterion- efficiency of estimator – least mean squared error criterion- Wiener filter – Discrete Wiener-Hoff equations – Recursive estimators – Kalman filter- linear prediction, prediction error- whitening filter, inverse filter – Levinson recursion and Levinson recursion algorithm for solving Toeplitz system of equations. Lattice recursion, Lattice realization

Adaptive Filters

FIR adaptive filters – Newton's Steepest Descent method – adaptive filter based on steepest descent method Widrow-Hoff LMS adaptive algorithm – Adaptive channel equalization- Adaptive Echo Canceller- Adaptive noise cancellation- RLS adaptive filters-Exponentially weighted RLS- sliding window RLS-simplified IIR LMS adaptive filter.

Multirate Signal Processing and Wavelet Transform

Review of Decimation and Interpolation Process. Sub band filter theory – Perfect Reconstruct (PR) condition – Cosine modulated filters – Para-unitary filters. Application of wavelet transform with Sub band filter theory. Wavelet transform as a correlator- Multiresolution theory – Heisenberg uncertainty principle – Two dimensional wavelet transform.

REFERENCES

1. John G. Proakis, Dimitris G. Manolakis, "Digital Signal processing", Prentice Hall of India, Fourth Edition 2006.
2. Manson H.Hayes, "Statistical Digital Signal Processing and Modelling", John Wiley and sons, Inc., New York, 1996.
3. Sopocles J. Orfanidis, "Optical Signal Processing", McGraw Hill, 1990.
4. Fliege N. J ,Multirate, "Digital Signal Processing", John Wiley & Sons, 2000.

COURSE OUTCOMES

On completion of this course, the students will be able to

1. Have broad knowledge in Random Processes in signal Processing
2. Acquire in-depth treatment on methods and techniques in discrete-time signal transforms, digital filter design, optimal filtering power spectrum estimation, multi-rate digital signal processing.
3. Estimate the spectrum using parametric methods and non parametric methods and prediction using wiener FIR & IIR filters.
4. Analyse adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
5. Understand clearly about multi rate signal processing fundamentals.

Mapping Course Outcomes(Cos) with Programme Outcomes(Pos)												
Course Outcomes (Cos)	**Programme Outcomes(Pos)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓	✓	✓	✓	✓						
CO2	✓	✓	✓	✓	✓	✓			✓			
CO3	✓	✓	✓		✓	✓			✓			
CO4	✓	✓										
CO5	✓	✓		✓								

ECCSMC15	RESEARCH METHODOLOGY AND IPR	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To understand research problem formulation and Analyze research related information
- To Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

REFERENCES

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall , "Industrial Design", McGraw Hill, 1992.
6. Niebel , "Product Design", McGraw Hill, 1974.
7. Asimov , "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

COURSE OUTCOMES

At the end of this course, students will be able to

1. Understand and Analyze research related problem.
2. Follow research ethics
3. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

4. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Mapping Course Outcomes(Cos) with Programme Outcomes(Pos)												
Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓		✓						✓	
CO2		✓				✓			✓			
CO3	✓	✓		✓		✓	✓			✓		
CO4			✓			✓			✓			✓

ECCSCP16	ADVANCED DIGITAL COMMUNICATION TECHNIQUES LAB	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES

- To understand underlying concepts in signal processing
- To have a complete understanding of error–control coding.
- To understand encoding and decoding of digital data streams.
- To provide a comprehensive analysis of spread spectrum systems
- To have a knowledge of the basics of OFDM.

LIST OF EXPERIMENTS

1. Simulation of Convolutional Coding Techniques.
2. Simulation of Linear Block Coding Techniques.
3. Simulation of Arithmetic Coding Techniques.
4. Simulation of Huffman Coding.
5. Simulation of Turbo Coding.
6. Simulation of Direct Sequence Spread Spectrum System.
7. Simulation of Frequency Hopping Spread Spectrum System.
8. Study of QPSK and QAM Modulation Technique.
9. Simulation of Pulse Radar Parameter on Detection Range.
10. Simulation of OFDM System.

COURSE OUTCOMES

1. Able to learn about signal processing concepts.
2. Able to understand the practical implementation issues, such as Error control coding, source coding.
3. Learn about design and simulation of modulation and coding techniques using software.
4. Know about Turbo Coding and Huffman Coding
5. Understanding of application of OFDM for communication systems.

Mapping Course Outcomes(Cos) with Programme Outcomes(Pos)												
Course Outcomes	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓		✓							
CO2		✓				✓			✓		✓	
CO3	✓	✓		✓		✓						
CO4			✓			✓			✓	✓		

ECCSCP17	ADVANCED DIGITAL SIGNAL PROCESSING LAB	L	T	P	C
		0	0	3	2

COURSE OBJECTIVES

- To learn about the adaptive filtering algorithms.
- To study the basics of pitch estimation in speech signal and formulation of Linear Prediction.
- To learn the short term power spectrum of sound using MFC.
- To generate binary sequence using Gold Code, Kasami code.
- To study the concepts of micro strip patch antenna.
- To analyze the spectral characteristics of AWGN noise and Colored noise.

LIST OF EXPERIMENTS

1. Simulation of Adaptive Filters using LMS and RLS algorithm.
2. Pitch Estimation for Speech.
3. Linear Prediction Analysis of Speech Signal.
4. Mel Frequency Spectral Coefficients.
5. Simulation of Gold Cold Technique.
6. Simulation of Kasami Code Sequence.
7. Measurement of Frequency Response Directivity and Radiation Efficiency of Microstrip Square Patch Antenna.
8. Simulation of Spectral Analysis of AWGN and Colored Noise.
9. Spectral Characterization of communication signals (using Spectrum Analyzer).
10. Wireless Channel simulation and characterization

COURSE OUTCOMES

1. Ability to design LMS and RLS adaptive filters for signal enhancement, channel equalization.
2. The ability to analyze speech signal using of Linear Prediction.
3. Able to extract features speech using MFC.
4. Able to generate binary sequence for digital applications.
5. Able to handle the noise in any system.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes (COs)	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓	✓		✓					✓	
CO2			✓		✓				✓	✓		✓
CO3				✓	✓	✓	✓		✓			
CO4						✓			✓		✓	
CO5		✓			✓			✓				✓

ECCSPC21	ADVANCED RADIATION SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce the fundamental principles and vital parametersof antennas in general and to apply them to the design and analysis of antenna systems.
- To learn the basic concepts of Radiationin wave guides and aperture and apply them to standard antenna.

- To study the various frequency dependent and independentantennas.
- To learn about printed antennas particularly microstrip antennas including design,and it's analysis.
- Different types of antennas and their applications will be introduced, with focus on Frequency independent antenna, Travelling Wave antennas, microstrip patch antennas, V-antenna, Reflector antenna, and the design considerations of using antennas in wireless communication systems.

Concepts of Radiation

Physical Concept of Radiation: Radiation from surface and line current distributions - radiation pattern - near and far field regions - reciprocity - directivity and gain – effective aperture - polarization - input impedance - efficiency - Friss transmission equation – radiation integrals and auxiliary potential functions.

Aperture and Reflector Antennas

Huygens's principle - radiation from rectangular and circular apertures – design considerations - Babinets principle - radiation from sectoral - pyramidal - conical and corrugated horns - design concepts of parabolic reflectors and cassegrain antennas.

Broadband Antennas

Principles - design and properties of log periodic - yagi-uda - frequency independent antennas - loop antenna - helical antennas - biconical antennas - broadcast antenna - spiral antenna and slot antennas.

Microstrip Antennas

Microstrip Antennas: Radiation mechanism - parameters and applications - feeding methods - method of analysis - design of rectangular and circular patch - impedance matching of microstrip antennas.

Applications

Antennas for biomedical applications - smart antennas for mobile communications – antenna for infrared detectors - marine applications - plasma antennas.

REFERENCES

1. Jordan E.C, "Electromagnetic Waves and Radiating Systems", Prentice Hall of India, 2003.
2. Balanis C.A, "Antenna Theory", 2nd Edition, Wiley, 2003.
3. J.D. Krauss, "Antennas", Tata McGraw Hill, 2006.
4. Elliot, "Antenna Theory and Design", IEEE press, 2003.

COURSE OUTCOMES

On completing this course the students should be able to:

1. Understand the basic concepts and characteristics of antennas in the transmit and receive mode.
2. Understand the concept of standard antenns,it's type and to understand the vitality and design of reflectors in microwave communication.
3. Design and analyze frequency independent antenna, Travelling Wave antennas, microstrip patch antennas, V-antenna, Reflector antenna.
4. Analyze and design aperture antennas such as horns, slots, and microstrip patches, smart and plasma antennas.
5. Design and analyze reflector antennas using geometrical optics or physical optics techniques and to learn it's significance through a thorough study of it applications.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes (COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓									✓	
CO2	✓	✓					✓					
CO3	✓	✓	✓	✓		✓			✓		✓	
CO4	✓	✓	✓	✓		✓						✓
CO5	✓	✓	✓	✓		✓				✓		

ECCSPC22	**ADVANCED WIRELESS COMMUNICATION ENGINEERING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To introduce various wireless channel models
- To compare different diversity and combining technique
- To make channel capacity for multiple antennas.
- To learn the concept of capacity of Wireless Channels
- To study MIMO Communication Techniques

Mobile Radio Propagation: Path Loss and Shadowing

Radio Wave Propagation, Transmit and Receive Signal Models, Free-Space Path Loss, Ray Tracing: Two-Ray Model, Dielectric Canyon (Ten-Ray Model), General Ray Tracing, Simplified Path Loss Model, Empirical Path Loss Models: Okumura's Model, Hata Model, Walfisch / Bertoni Model, Piecewise Linear (Multi-Slope) Model, Indoor Propagation Models, Shadow Fading, Combined Path Loss and Shadowing, Outage Probability under Path Loss and Shadowing, Cell Coverage Area.

Statistical Multipath Channel Models

Time-Varying Channel Impulse Response, Narrowband fading models: Autocorrelation, Cross Correlation, and Power Spectral Density, Envelope and Power Distributions, Level Crossing Rate and Average Fade Duration, Finite State Markov Models, Wideband Fading Models: Power Delay Profile, Coherence Band width, Doppler Power Spectrum and Channel Coherence Time, Transforms for Autocorrelation and Scattering Functions, Discrete-Time Model, Spatio-Temporal Models.

Capacity of Wireless Channels

Introduction, Capacity in AWGN, Capacity of Flat-Fading Channels : Channel and System Model, Channel Distribution Information (CDI) Known, Channel Side Information at Receiver, Channel Side Information at the Transmitter and Receiver, Capacity with Receiver Diversity, Capacity Comparisons, Capacity of Frequency-Selective Fading: Time-Invariant Channels, Time-Varying Channels

Diversity

Realization of Independent Fading Paths, Diversity System Model, Selection Combining, Threshold Combining Maximal Ratio Combining, Equal-Gain Combining, Moment Generating Functions in Diversity Analysis: Diversity Analysis for MRC, Diversity Analysis for EGC and SC Diversity Analysis for Non coherent and Differentially Coherent Modulation, Transmitter Diversity

MIMO Communications

Narrow Band MIMO Model, Parallel Decomposition of the MIMO Channel, MIMO Channel Capacity, MIMO Diversity Gain: Beam forming, Diversity Multiplexing Trade Off, Space Time Modulation and Coding: STBC, STTC, Spacial Multiplexing and BLAST Architecture.

REFERENCES

1. Andrea Goldsmith, "Wireless Communications", Cambridge University Press, 2007.
2. Theodore S. Rappaport , "Wireless Communications Principles and Practices", Second Edition, Pearson Education, Asia, 2002.
3. David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005.
4. A.Paulraj, R.Nabar, D.Gore, "Introduction to Space Time Wireless Communications", Cambridge University Press, 2003.

COURSE OUTCOMES

The student would have the

1. Diverse knowledge in wireless communication.
2. Understanding of basic Channel Capacity
3. Knowledge in Multiple Input Multiple Output Concepts
4. Knowledge in multipath channel modelling
5. Familiarity in Diversity Analysis

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes (COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓	✓			✓						
CO2		✓	✓	✓							✓	
CO3	✓	✓	✓	✓				✓				
CO4		✓	✓	✓								
CO5			✓	✓	✓							

ECCSCP26	**ADVANCED RADIATION SYSTEMS LAB**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**2**

COURSE OBJECTIVES

- To enable the students to verify the basic principles and design aspects involved in high
- frequency communication systems components
- To expose the student to different high frequency components and conduct the
- experiments to analyze and testing the antennas
- To design and develop Monopole Antennas

LIST OF EXPERIMENTS

1. Simulation of half wave dipole antenna.
2. Simulation of change of the radius and length of dipole wire on frequency of resonance of antenna.
3. Simulation of quarter wave, full wave antenna and comparison of their parameters.
4. Simulation of monopole antenna with and without ground plane.
5. Study the effect of the height of the monopole antenna on the radiation characteristics of the antenna.
6. Simulation of a half wave dipole antenna array.

7. Study the effect of change in distance between elements of array on radiation pattern of dipole array.
8. Study the effect of the variation of phase difference 'beta' between the elements of the array on the radiation pattern of the dipole array.

COURSE OUTCOMES

At the end of this course, students will be able to

1. Determine specifications, design, construct and test antenna.
2. Explore and use tools for designing, analyzing and testing antennas. These tools include
3. Antenna design and analysis software, network analyzers, spectrum analyzers, and antenna pattern measurement techniques

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes (COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓	✓			✓						
CO2				✓								
CO3	✓							✓			✓	
CO4										✓		
CO5			✓									

ECCSTS27	**INDUSTRIAL TRAINING AND SEMINAR / MINI PROJECT**	**L**	**Tr**	**S**	**C**
		0	**2**	**2**	**2**

COURSE OBJECTIVES

- To train the students in the field work related to Communication Systems and to have a practical knowledge in carrying out the related problems.
- To train and develop skills in solving problems during execution of the problems.
- To work on a technical topic related to Communication Systems and acquire the ability of written and oral presentation.
- To acquire the ability of writing technical papers for Conferences and Journals.

The students will individually undertake a training program in reputed concerns in the field of Communication systems during summer vacation (at the end of second semester for Full Time / Fifth semester for Part – Time) for a minimum stipulated period of four weeks. At the end of training the student has to submit the detailed report on the training undertaken within ten days from the commencement of the third semester for Full Time / Fifth semester for Part – Time. The student will be evaluated by a team of staff members nominated by the Head of the Department through a viva-voce examination.

For seminar/mini project, the students will work for two periods per week guided by a faculty. They will be asked to give a presentation of not less than 15 minutes and not more than 30 minutes (on any technical topic for seminar and on the project title for mini project). They will defend their presentation. A brief copy of their presentation also should be submitted. Evaluation will be done by the examiners based on the technical presentation, the report and also on the interaction shown during the seminar/viva for seminar and mini project respectively.

COURSE OUTCOMES

After the completion of the course, the students will be able to

1. Analyze a given Communication Engineering problem and to identify and implement appropriate problem solving methodology to propose a meaningful solution.
2. Understand of contemporary / emerging technology for various processes and systems.
3. Share knowledge effectively in oral and written form and formulate documents.
4. Acquire the ability to work in the actual environment and to use the technical resources.
5. Analyse any short coming while implementing a technical problem and to handle the same.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes (COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓					✓					✓	
CO2	✓	✓	✓	✓					✓	✓		
CO3	✓											✓
CO4		✓					✓			✓		✓
CO5	✓											✓

ECCSPV33	**PROJECT WORK AND VIVA-VOCE PHASE-I**	**L**	**Pr**	**S**	**C**
		0	**16**	**4**	**10**

COURSE OBJECTIVES

- To train the students in the current thrust area in Communication Engineering and to have practical knowledge in handling the technical scenario.
- To develop skills on the research topic and to implement the appropriate methods to handle the issue.
- To apply the relevant knowledge and skills, which are acquired within the technical area, to the relevant problems in the area of communication.

The students will individually undertake a research problem in the field of Communication Engineering in the third semester for Full-Time / Fifth semester for Part-Time. The student will be guided by a staff member. The progress of the research will be evaluated every month by a team of staff members. The student has to submit the detailed report on the research problem at the end of Third semester for Full-Time / Fifth semester for Part-Time. The student will be evaluated by a team of examiners nominated by the Head of the Department through a viva-voce examination.

COURSE OUTCOMES

On completion of this course the students will be able to

1. Prepare the final report of project work in standard format for satisfactory completion of the work.
2. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
3. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
4. Ability to present the findings of their technical solution in a written report.
5. Presenting the work in International/ National conference or reputed journals.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes (COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓	✓			✓						
CO2				✓								
CO3	✓							✓			✓	
CO4										✓		
CO5			✓							✓		✓

ECCSPV41	**PROJECT WORK AND VIVA-VOCE PHASE – II**	**L**	**Pr**	**S**	**C**
		0	**24**	**6**	**15**

COURSE OBJECTIVES

- To train the students in the current thrust area in Communication Engineering and to have practical knowledge in handling the technical scenario.
- To develop skills on the research topic and to implement the appropriate methods to handle the issue.
- To apply the relevant knowledge and skills, which are acquired within the technical area, to the relevant problems in the area of communication.

The students will continue the research problem undertaken during third semester for Full-Time / Fifth semester for Part-Time in the field of Communication Engineering. The student will be guided by a staff member. The progress of the research will be evaluated every month by a team of staff members. The student has to submit the detailed report on the research problem at the end of Fourth semester for Full-Time / Sixth semester for Part-Time. The student will be evaluated by a team of examiners nominated by the Head of the Department through a viva-voce examination.

COURSE OUTCOMES

After the completion of the course, the students will be able to

1. Conduct independent empirical research to evaluate and present their results responsibly and critically.
2. Maintain the ethical standards of scientific research and to follow the basic principles in an academic community that requires constant learning and knowledge updation.
3. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
4. Ability to present the findings of their technical solution in a written report.
5. Presenting the work in International/ National conference or reputed journals.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes (COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓	✓			✓				✓		
CO2	✓			✓								
CO3	✓	✓			✓			✓			✓	✓
CO4			✓				✓			✓		
CO5	✓		✓							✓		✓

PROGRAM ELECTIVES

ECCSPESC	RF ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the fundamental concepts of passive RF components and basic transmission line concepts.
- To explore the concepts of modulation techniques.
- To introduce transmitter and receiver system design techniques and analysis through three terminal RF device and it's active applications, role in a communication system.
- To understand the basics of radio system design and applications, rf technology, and it's components.
- To study the Designing of RF system.

RF Passive Components and Transmission Line Analysis

High Frequency Resistors: Capacitors and inductors – transmission line analysis – line equation – microstrip line – SWR voltage reflection co-efficient propagation constant – phase constant – phase velocity – Smith chart – parallel RL and RC circuits – ABCD parameters and S parameters.

RF Active Components and RF Amplifier Design

RF Diode: PIN diode – Gunn Diode – RF bipolar junction transistor – RF field effect transistor – modeling of diode – transistor and FET; RF Amplifier: Characteristics – power relational and stability considerations – LNA – power amplifiers – differential amplifiers – distributed power amplifiers and broadband amplifiers.

RF Circuits Design

RF Oscillator Design: Fixed frequency oscillator – dielectric resonant oscillator – voltage controlled oscillator – sun element oscillator; RF Mixer Design: Single ended mixer – double ended mixer; RF Filter Resonator and Filter Configuration: Butterworth and Chebyshev filters – design of microstrip filters.

RF IC Design

Introduction to RFIC: Analog and microwave design versus RFIC design – noise performance estimation – RF technology – receiver with single IF stage metallization – sheet resistance – skin effect –parasitic capacitance and inductance – current handling – metal capacitors – spiral inductors – quality factor – layout in IC – mutual inductance – multilevel – measurement – packaging.

RF System Design

Link Design: Fading design – protected and non protected microwave systems – path calculation – spread spectrum microwave system – compatibility – safety coordinate systems – Datam's and GPS – receiver design – receiver architecture dynamic range – Frequency conversion and filtering; Examples of Practical Receivers: FM broadcast – digital cellular – multimeter wave point to point – Direct conversion GSM receiver; RF MEMS: Concept – implementation and applications.

REFERENCES

1. Reinhold Ludwig and Pavel Bretchko, "RF Circuit Design", Pearson Education, 2007.
2. David Pozar, "Microwave and RF Design of Wireless Systems", John Wiley, 2008.
3. Josn Rogers and Calvin Plett, "Radio Frequency Integrated Circuit Design", Artech House, 2002.
4. Ferri Losee, "RF systems, Components and Circuits Handbook", Artech House, 2002.
5. Joseph J. Carr, "Secrets of RF Circuit Design", Tata McGraw Hill, 2004.

6. Vivek Varadhan, K J. Vinoy and Jose, "RF MEMS and Their Applications", Wiley Eastern Edition, 2003.

COURSE OUTCOMES

On completion of this course, the students will be able to

1. Understand the basic concepts of RF wireless communications, three terminal devices design and it's challenges.
2. Acquire the detail view of communication protocol and design of RF application to industry and passive component design
3. Analyze and design various transmitters and receivers
4. Understand the basics of radio system design and applications
5. Gain Knowledge in RF system design

Mapping Course Outcomes(Cos) with Programme Outcomes(Pos)												
Course Outcomes(Cos)	Programme Outcomes(Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓	✓								✓	
CO3	✓		✓	✓		✓			✓			
CO4	✓		✓	✓		✓						✓
CO5			✓	✓					✓			

ECCSPESC	OPTICAL NETWORKKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To develop an in-depth understanding, in terms of architecture, protocols and applications, of major optical networking technologies.
- To provide an exposure to solve numerical or analytical problems pertaining to the optical networking technologies
- To initiate the necessary background to perform projects involving optical networks.
- To learn the concepts of virtual topology design
- To learn Next Generation Optical Internet Networks

WDM Technology and Issue in WDM Optical Networks

Introduction – Optical Networks – WDM – WDM Optical Networking Evolution - Enabling Technologies for WDM Optical Networks – WDM Optical Network – Architecture – Issues in Wave Length Routed Networks – Next Generation Optical Internet Networks.

Wavelength Routing Algorithms

Introduction – Classification of RWA Algorithms Fairness and Admission Control – Disturbed Control Protocols – Permutation Routing and Wavelength Requirements - Wavelength rerouting algorithms - Introduction – Benefits of Wavelength Routing- Issues in Wavelength Routing – Light Path Migration – Rerouting Schemes – Algorithm AG – Algorithm MWPG Rerouting in WDM Networks With Sparse Wavelength Conversion – Rerouting in Emulsifier Networks – Rerouting in Multifiber Unidirectional Ring Networks.

Wavelength Convertible Networks

Introduction – Need For Wavelength Converters - Wavelength Convertible Architecture – Routing in Convertible Networks – Performance Evaluation of Convertible Networks – Networks With Sparse Wavelength Conversion – Converter Placement Problem – Converter Allocation Problem.

Virtual Topology Design

Introduction – Virtual Topology Design Problem – Virtual Topology Design Sub Problems – Virtual Topology Design Heuristics – Regular Virtual Topology Design – Predetermined Virtual Topology and Light Path Routes – Design of Multifiber Networks -Virtual Topology Reconfiguration - Introduction – Need for Virtual Topology Reconfiguration – Reconfiguration due to Traffic Changes, Reconfiguration for Fault Restoration.

Network Survivability and Provisioning

Failures and Recovery – Restoration Schemes – Multiplexing Techniques – Distributed Control Protocols. Optical Multicast Routing – Next Generation Optical Internet Networks.

REFERENCES

1. Siva Ram Murthy.C and Mohan Gurusamy., "WDM optical networks", Concepts, Design and Algorithms . Prentice Hall India, 2002.
2. Rajiv Ramasami and Kumar N. Sivarajan, "Optical networks" A Practical Perspective , A Harcourt publishers international company,2000.

COURSE OUTCOMES

On completion of this course the students will be able to

1. To get an in-depth understanding, in terms of architecture, protocols and applications, of major optical networking technologies.
2. Able to solve numerical or analytical problems pertaining to the optical networking technologies
3. To understand the necessary background to perform projects involving optical networks.
4. To impart knowledge in virtual topology design
5. To have knowledge on latest methods in Optical Internet Networks

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓			✓			
CO2	✓	✓		✓		✓						
CO3			✓	✓	✓	✓		✓	✓			
CO4	✓	✓		✓		✓						
CO5	✓		✓	✓	✓	✓						

ECCSPESC	WIRELESS SENSOR NETWORKKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To study the characteristics of access mechanisms in wireless networks and Mobile IP and TCP routing protocols.
- To obtain a broad understanding of the technologies and applications for the emerging and exciting domain of wireless sensor networks.
- To study the challenges and latest research results related to the design and management of wireless sensor networks.
- To focus on network architectures and energy management
- To learn about security related issues.

Networks Fundamentals

Introduction to wireless network and M-computing –Fading and shadowing communication – Mobile IP – overview – Network elements - packet delivery – registration – Tunneling and

encapsulation – optimization –Traditional TCP and inspection on Mobility – indirect and snooping TCP – 2G/3G – Beyond 3G Networks.

Architecture

Introduction to sensor networks – Architectures – design factor – sensor network classifications - characteristics – Modeling of sensor network - WSN as Embedded system – Tiered architectures in sensor network – Forming of tiered network - Draw backs - Power efficient topology in WSN- Issues – Assumptions.

Protocols

MAC- Hidden/Exposed terminals – Near/Far terminals – SDMA, FDMA, TDMA and CDMA – infrared transmission – MAC Layer synchronization –power management – roaming – SMACS and EAR algorithm – CSMA –Hybrid TDMA/FDMA – Adhoc networks – Clustering Algorithm – Leach – Teen – Peach Technique.

Security System

Security Protocols –Authentication – Network layer – Security techniques – Security in WSN – Adhoc network – Search Technique – Security management technique - Reliability issues in WSN – Distributed sensor systems – Distributed services – Dynamic adaption – Fault tolerance - pre limiters – classic fault.

Energy Management

Introduction – Different power management technology – Design in EEMAC – Reduce communication – Node level energy management – Node Level Processor Oriented Energy Management – Node level I/O device oriented Energy Management – Energy aware routing.

REFERENCES

1. Mohammed Ilyas and Imad mahgoub, “Handbook of sensor networks, compact wireless and wired sensing systems”, CRC press, 2005.
2. Rappaport T.S, “Wireless Communication Principles and Practice”, Prentice Hall,1996.
3. Jon S.Wilson, Elseviewer , “Sensor technology handbook,”
4. Taub H. and .Schilling D.L, “Principle of Communication”, McGraw-Hill; 1989.
5. Simon Haykin, “Communication Systems”, John Wiley; 1995.

COURSE OUTCOMES

On completion of this course the students will be able to

1. Understand the concepts of wireless communication.
2. Acquire knowledge about the various propagation methods and Channel models.
3. Have an enhanced understanding of various transceivers and its multiple access schemes.
4. Gain knowledge in Energy Management Technology
5. Understand the fundamentals of Security in WSN

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓	✓						
CO2	✓	✓	✓									
CO3	✓		✓	✓		✓						
CO4	✓	✓		✓		✓	✓		✓			
CO5	✓	✓	✓	✓		✓						

ECCSPESC	SPEECH PROCESSING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the mathematical foundations needed for speech processing.
- To highlight the basic concepts and algorithms of speech processing and synthesis.
- To familiarize the students with the various speech signal representation, coding and recognition techniques.
- To study the basic theory of speech recognition
- To appreciate the use of speech processing in current technologies and to expose the students to real– world applications of speech processing.

Fundamentals of Digital Speech Processing

Introduction – Discrete Time Signals and Systems – Transform Representation of Signals and Systems – Z-transform – Fourier Transform – Discrete Fourier Transform.

Digital Models for Speech Signal: The Process of Speech Production – Acoustic Theory of Speech Production – Lossless Tube Models – Digital Models for Speech Signals.

Time Domain Models for Speech Processing

Time-Dependent Processing of Speech – Short Time Average Zero Crossing Rate – Short Time Autocorrelation Function - Pitch Period Estimation using Autocorrelation Function – median Smoothing and Speech Processing.

Speech Coding

Introduction-Quantization-Speech quality measure-time-domain waveform coding-Linear predictive coding –Linear Delta Modulation-Adaptive Delta Modulation-Adaptive differential Pulse Code Modulation-Linear Predictive Coders- Synthesis Based Linear Predictive Analysis-Spectral coders – Sub Band Coders-Adaptive Transform Coders - Vocoders - Vector quantization coders-Code Excited Linear prediction.

Automatic Speech Recognition

Introduction – Basis Pattern Recognition Approach – Preprocessing – Parametric Representation Dynamic time warping – Networks for Speech Recognition - Hidden Markov model - Language models -Artificial neural network - Expert-System approach to Automatic Speech Recognition.

Speech Synthesis

Introduction - Principles of Speech Synthesis - Synthesizer Methods – Articulatory Synthesis – Formant Synthesis – Linear Predictive Coding Synthesis – Excitation Modeling – Synthesis of Intonation – Speech Synthesis for Different Speakers – Speech Synthesis in Other Languages – Evaluation of TTS Systems.

REFERENCES

1. D. O' Shaughnessy, “Speech communications”, Human and Machine, Second Edition, UniversityPress (India), 2001.
2. L. R. Rabiner and R.W. Schafer, “Digital Processing of Speech Signals”, Pearson Education, 2007.
3. L. Rabiner and R.H. Juang, “Fundamentals of Speech Recognition”, Pearson education, 2003.

COURSE OUTCOMES

On completion of this course, the students will be able to

1. Understand speech processing fundamentals.
2. Understand algorithms of speech processing and synthesis.
3. Represent various speech signals, coding and recognition techniques
4. Generate coding for Speech Processing

5. Use speech processing in current applications.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓						
CO2	✓	✓										
CO3	✓	✓	✓									
CO4	✓		✓	✓		✓						
CO5	✓	✓	✓	✓		✓	✓		✓			

ECCSPESC	SPREAD SPECTRUM COMMUNICATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce the basic concepts of spread spectrum communications.
- To familiarize with several spread spectrum techniques and its performance in jamming environments.
- To study Frequency Hopping Ss System
- To gain knowledge on spread spectrum receivers.
- To understand various applications of spread spectrum techniques.

Introduction

Origin of Spread Spectrum communications - advantages of spectrum spreading - Types of techniques used for spread spectrum - processing gain and other fundamental parameters - jamming methods - linear feedback, shift register and sequence generation - M-sequence and their statistical properties - correlation properties - non-linear sequences - gold codes - Kasami sequences.

Direct Sequence Spread Spectrum System

Coherent direct sequence systems-model of a DS/BPSK system - uncoded bit error probability for arbitrary jammer waveforms - Cheruoff bound-performance under constant power broadband noise jammer - pulse jammer - partial band jammer-multitone jammer - coded DS/BPSK system.

Frequency Hopping SS System

Non-coherent FH system model - coherent FH systems - frequency synthesis -performance of FH/QPSK and FH/DPSK systems in partial band jamming - time hopping SS technique.

Synchronization of SS Receivers

Acquisition and tracking in DS SS receivers and FH SS receivers – Sequential estimation – Matched filter techniques of acquisition and tracking – Delay locked loop – Tau-Dither loop.

Applications

Code division multiple access - satellite communication – anti-jam military communication - low probability of intercept communication - mobile communication.

REFERENCES

1. R.C.Dixion, “Spread spectrum systems”, John Wiley, 1984.
2. M.K.Simon, J.K.Omura, R.A.Schiltz and B.K.Levitt, “Spread spectrum communication”, Vol-I, II&IV, computer science press, USA, 1985.
3. G.R.Cooperand, CD.Mc.Gillem, “Modern communications and spread spectrum”, McGraw Hill, 1986.

COURSE OUTCOMES

On completion of this course, the students will be able to

1. Describe the types and advantages of spread spectrum modulation formats.
2. Perform analysis on the performance of spread spectrum modulation formats.
3. Describe the differences and benefits of different types of spreading codes.
4. Analyze the performance of spread spectrum systems in the presence of interference.
5. Analyze the performance of spreading code acquisition and tracking circuits.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									
CO2	✓	✓	✓			✓						
CO3	✓	✓	✓			✓						
CO4	✓	✓	✓			✓						
CO5	✓	✓		✓		✓			✓			

ECCSPESC	MICROWAVE ANTENNAS AND INTEGRATED CIRCUITS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand signal propagation at Radio frequencies & to study aperture and reflector antennas.
- To have a knowledge on the concept of Microstrip antennas.
- To introduce to the students the basics of Microstrip Patch Antennas and its analysis
- To learn about the solid state active devices for MICs.
- To study Microwave Solid – State Active Devices for MICS
- To collect ideas in Applications of MICs

Aperture and Horn Antennas

Huygen's Equivalence Principle - Radiation from Rectangular and Circular Apertures E-Plane And H-Plane Sectoral Horns – Design Aspects - Radiation From E-Plane Sectoral Horn - Over View of Pyramidal Horn, Conical, Corrugated Horn – Gain Measurement by Standard Horn Antennas.

Satellite Antennas

Radiation and Impedance Properties of Parabolic Reflector Antenna And Cassegrain Antenna - Spillover Loss - Corner Reflector - Lens Antenna.

Antenna Arrays**:** Linear Array With Non-Uniform Current Distribution (Dolph-Tchebyscheff Distribution - Taylor Distribution - Design Considerations) - Planar Array - Phased Array - Adaptive Antenna Array.

Planar Transmission Lines - Fabrication Aspects of MMIC

Planar Transmission Lines For MICS - Different Types - Micro Strip Line – CPW- CPS, FIN Line - Analysis - Comparison of Micro Strip Line, Fin Lines And Coplanar Lines - Analysis of Fin Lines - Conductor Loss in Fin Lines - Design of Microstrip Lines. Introduction to Coplanar Wave Guide And Coplanar Strips - MMIC Fabrication Techniques.

Microstrip Antennas

Radiation From Micro Strip Patch - Electric And Magnetic Current Distributions - Feeding Techniques - Cavity Model Analysis Of Rectangular And Circular Microstrip Antennas -

Design of Rectangular, Circular Microstrip Patch Antennas - Dual-Frequency Micro Strip Antennas - Circularly Polarized Micro Strip Antennas - Broadband and Ultra Wide Band Micro Strip Antennas - Basic Characteristics of Stacked-Electromagnetic Coupled and Aperture Coupled Micro Strip Antennas - Aperture Coupled Stacked Micro Strip Antennas.

Microwave Solid – State Active Devices for MICS

Thick and Thin Film Technologies and Materials - Encapsulation and Mounting of Active Devices. Micro Strips on Semiconductor Substrates. Applications of MICs Phased Array Radar System - Satellite T.V. System

REFERENCES

1. Balanis C. A., "Antenna Theory -Analysis & Design", Harper & Row Publisher
2. Collin R. E. , "Antennas & Radiowave Propagation", Mcgraw-Hill Intnl.
3. Garg, R. Bhartia P., Bhal. I & Ittipiboon A. "Microstrip Antenna Design", Handbook
4. Samuel Y. Liao.Microwave Devices & Circuits 3/E
5. Gupta. K.C. Microwave Integrated Circuits
6. Bhat B. Koul S. K. Stripline-Like Transmission Lines For Microwave Integrated Circuits, , Wiley Eastern Ltd., New Delhi.

COURSE OUTCOMES

At the end, the student would be able to

1. Understand signal propagation at Radio frequencies
2. Acquire the knowledge about the Microstrip antennas
3. Get the foundation about solid state active devices
4. Gain Knowledge in MICS
5. Gather Practical Applications of MICs

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2		✓	✓									
CO3			✓	✓		✓			✓			
CO4	✓	✓		✓	✓	✓						
CO5		✓		✓	✓	✓						

ECCSPESC	RF MEMS FOR WIRELESS COMMUNICATION SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To provide knowledge on Microsystems fabrication process and Micromachining.
- To understand the fundamentals of RF MEMS circuit elements, MEMS based circuit design
- To gain knowledge in applications to wireless communications.
- To study the theory of MEMS component
- To learn MEMS based circuit design

Introduction to RF MEMS Technologies

Need for RF MEMS Components in Communications – Space and Defense Applications – Materials and Fabrication Technologies – Special Consideration in RF MEMS Design.

Fabrication Process and Micromachining

Markets for Microsystems and MEMS**,** Substrates and material properties – Doping – Oxidation – Concepts of Bulk Micro machining and Surface Micro machining- Additive Processes – Evaporation and sputtering – Chemical vapor deposition (CVD)- Lithography- Wet etching: Isotropic– Anisotropic – Etch stops- Dry etching: Vapour – Plasma / RIE –DRIE- Other processing techniques and materials: LIGA– Lift-off– Chemical Mechanical Polishing (CMP)– Soft Lithography and polymers – Wafer Bonding – Design rules and Mask making.

RF MEMS Components

MEMS Inductors and Capacitors: Micromachined Inductor, Effect of Inductor Layout – Modeling and Design Issues of Planar Inductor – Gap Tuning and Area Tuning Capacitors – Dielectric Tunable Capacitors.

MEMS Phase Shifters: Types – Limitations – Switched Delay Lines – Micromachined Transmission Lines – Coplanar Lines – Micromachined Directional Coupler and Mixer.

RF MEMS Circuit Elements

Enabled Circuit Elements – Capacitors – Inductors – Varactors – MEM Switch- Shunt MEM Switch – Low Voltage Hinged MEM Switch Approaches – Push-Pull Series Switch – Folded – Beam – Springs – Suspension Series Switch – Resonators – Transmission Line Planar Resonators – Cavity Resonators – Micromechanical Resonators – Film Bulk Acoustics Wave Resonators – MEMS Modeling – Mechanical Modeling – Electromagnetic Modeling.

Advanced RF MEMS Circuits

Enabled Circuit – Reconfigurable Circuits – The Resonant MEMS Switch – Capacitors – Inductors – Tunable CPW Resonator – MEMS Micro switch Arrays – Reconfigurable Circuits – Double – Stub Tuner – nth Stub Tuner – Filter- Resonator Tuning System – Massively Parallel Switchable RF Front Ends – True Delay Digital Phase Shifters- Reconfigurable Antennas – Tunable Dipole Antennas – Tunable Microstrip Patch – Array Antenna.

RF MEMS based Circuit Design

Phase Shifters – Fundamentals- X-Band RF MEMS Phase Shifter For Phased Array Applications – Ka-Band and RF MEMS Phase Shifter For Radar Systems Applications- RF MEMS Filters – Ka-Band, Millimeter Wave Micro Machined Tunable Filter – High-Q 8MHz MEM Resonators Filter- RF MEMS Oscillators – Fundamentals – 14GHz MEM Oscillators – Ka-Band Micro Machined Cavity Oscillator- 2.4 GHz MEMS Based Voltage Controlled Oscillator.

REFERENCES

1. Hector J. De Los Santros, "RF MEMS Circuit Design for Wireless Communication" ,Artech House, 2002.
2. Vijay K. Varadan, Vinoy K.J, Jose k.A., "RF MEMS and their Applications" , John Wiley and Sons., Ltd., 2002.
3. Gabriel M.Rebeiz, "RF MEMS theory, Design and Technology", Wiley Interscience, 2002.
4. Tai-Ran-Hsu, "MEMS & Microsystems Design and Manufacture", Tata McGraw Hill, New Delhi, 2002

COURSE OUTCOMES

At the end, the student would be able to

1. Familiarize with Microsystems fabrication process and Micromachining.
2. Understand physical aspects of RF circuit design.
3. Acquire knowledge on RF MEMS circuit elements such as switches, resonators, antennas etc.,
4. Design Practical RF MEMS devices.
5. Design MEMS based circuits

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓						✓			✓	✓
CO2												
CO3	✓	✓										
CO4					✓	✓	✓	✓				✓
CO5			✓	✓	✓		✓	✓		✓	✓	✓

ECCSPESC	OFDM FOR WIRELESS COMMUNICATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To impart knowledge about OFDM principles and its Implementation.
- To understand coding and interleaving techniques to reduce channel effects.
- To study various synchronization procedures in OFDM.
- To understand various channel estimation techniques and PAPR reduction schemes in OFDM system.
- To gain knowledge on OFDM multiple access schemes and applications of OFDM.

Introduction

Wireless channel fundamentals – Multicarrier transmission scheme– OFDM Principles – System Model – Generation of Sub Carrier Using IFFT – Guard Time and Cyclic Extension, Choice of OFDM Parameters – OFDM Signal Processing.

Coding, Modulation and Synchronization Techniques

Introduction – Forward Error Correction Coding – Interleaving – Quadrature Amplitude Modulation – Coded Modulation – Synchronization – Sensitivity to Phase Noise , Frequency Offset and Timing Errors – Synchronization Using Cyclic Extension and Special Training Symbols.

Channel Estimation and PAPR Reduction in OFDM System

Coherent Detection : One and Two Dimensional Channel Estimators , Special Training Symbols , Decision Directed Channel Estimation – Differential Detection : Differential Detection in the Time and Frequency Domain-Peak to Average Power Ratio (PAPR) reduction in OFDM system: Clipping and peak windowing, PAPR reduction codes, Selective Mapping and Partial Transmit Sequence.

Orthogonal Frequency Division Multiple Access

Frequency Hopping in OFDMA – Difference between OFDMA and MC-CDMA, OFDMA System Description – Channel Coding – Modulation – Time and Frequency Synchronization, Initial Modulation Timing and Frequency Offset Synchronization Accuracy – Power Control – Random Frequency Hopping Operation – Dynamic Channel (Simple and Fast) – Capacity of OFDMA.

Application of OFDM

Digital Audio Broadcasting –Terrestrial Digital Video Broadcasting. Wireless LAN Standards: IEEE 802.11 – Hyper LAN and MMAC –Difference between IEEE 802.11, Hyper LAN/2 and MMAC- Magic wand (Wireless ATM project). IEEE 802.11, Hyper LAN/ 2 and MMAC Wireless LAN standards – OFDM parameters, Channelization, OFDM signal processing, Training, Difference between IEEE 802.11, Hyper LAN/ 2 and MMAC.

REFERENCES

1. Richard Van Nee and Ramjee Prasad, "OFDM for Wireless Multimedia Communication", Artech House, 2000.
2. Mare Engels, "Wireless OFDM systems", Klumer Academic publishers, 2002.
3. Ye (Geoffrey) Li, Gordon L. Stiiber ." Orthogonal Frequency Division Multiplexing for Wireless Communications", Springer 2006.
4. Yong Soo Cho, Jaekwon Kim, Won Young Yang, Chung G. Kang, "MIMO-OFDM Wireless Communications with MATLAB", John wiley and sons 2010.
5. Ahmad R. S. Bahai, Burton R. Saltzberg, Mustafa Ergen, "Multi carrier Digital communication Theory and applications of OFDM", Second Edition, Springer 2004.

COURSE OUTCOMES

On completion of this course the students will be able to

1. Describe the principles of OFDM and its Implementation.
2. Implement the coding and interleaving procedure to mitigate the channel effects.
3. Analyze synchronization techniques, channel estimation techniques and PAPR reduction techniques in OFDM.
4. Describe multiple accesses in OFDM and various applications of OFDM.
5. Implement the coding for latest Applications.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓						
CO2	✓	✓	✓	✓							✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓					✓
CO4			✓	✓	✓	✓						✓
CO5						✓	✓	✓	✓	✓	✓	✓

ECCSPESC	MOBILE AD HOC NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce the characteristic features of Adhoc wireless networks and their applications to the students.
- To enable the students to understand the functioning of different access and routing protocols that can be used for Adhoc networks.
- To make the students to realize the need for security and challenges
- To learn the role of cross layer design in enhancing the network performance.
- To study about the end-to-end delivery and security

Introduction

Introduction to Ad Hoc networks – definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models: - entity and group models.

Medium Access Protocols

MAC Protocols: design issues, goals and classification. Contention based protocols, reservation based protocols, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

Network Protocols

Addressing issues in ad hoc network, Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Power/ Energy aware routing algorithm, Hierarchical Routing, QoS aware routing.

End-to-End Delivery and Security

Transport layer: Issues in designing- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

Cross Layer Design and Integration of Adhoc for 4G

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective, Co-operative networks:- Architecture, methods of co-operation, co-operative antennas, Integration of ad hoc network with other wired and wireless networks.

REFERENCES

1. C.Siva Ram Murthy and B.S.Manoj, "Ad hoc Wireless Networks Architectures and protocols", 2nd edition, Pearson Education. 2007
2. Charles E. Perkins, "Ad hoc Networking", Addison – Wesley, 2000.
3. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, "Mobile adhoc networking", Wiley-IEEE press, 2004.
4. T. Camp, J. Boleng, and V. Davies "A Survey of Mobility Models for Ad Hoc Network Research," Wireless Communication and Mobile Comp., Special Issue on Mobile Ad Hoc Networking Research, Trends and Applications, vol. 2, no. 5, 2002, pp. 483–502.
5. V.T. Raisinhani and S. Iyer "Cross layer design optimization in wireless protocol stacks", Computer communication, vol 27 no. 8, 2004.

COURSE OUTCOMES

On completion of this course the students will be able to

1. Understand the basics of mobile ADHOC networks
2. Got the knowledge of MAC and network protocols
3. Realize the need for security and challenges
4. Understand the role of cross layer design in enhancing the network performance.
5. Know the Integration of ad hoc network with other wired and wireless networks

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓					✓	✓
CO2	✓	✓									✓	✓
CO3			✓	✓		✓			✓			
CO4	✓	✓		✓							✓	✓
CO5				✓		✓			✓			

ECCSPESC	HIGH SPEED NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn about the ATM backbone and advanced network architecture for high performance communication networks.

- To acquire knowledge about MPLS architecture, signaling and routing protocols.
- To study the types of VPN and tunneling protocols for security.
- To study the research areas in MPLS
- To learn about Recent Trends In High Speed Networks

Introduction

Evolution of high speed networking – Synchronous Digital Hierarchy (SDH), Fibre Optic Network, Synchronous Optical Network (SONET) standards – Wave length division multiplexed (WDM) LAN – Basics of networking technologies – Fast Ethernet, Gigabit Ethernet, Frame relay DSL, ATM, MPLS, wireless networks such as 802.11,802.16,WiMax, 3G & 4G networks. Design considerations in high performance networking.

ATM

ATM Protocol architecture – core aspects, ATM Layers- ATM Adaptation layer-synchronous fast packet switching techniques and VP/VC encapsulation- ATM cells – ATM traffic Management - Connection management – Discrete time queue analysis and application to Connection Admission Control (CAC) – Peak Cell rate algorithm – Leaky Bucket algorithm.

MPLS

Introduction to MPLS, considerations in the choice of cells VS frames, IP over MPLS architecture &terminology, MPLS forwarding operations, MPLS encapsulation standards, MPLS signaling and routing protocols, research areas in MPLS.

Advanced Networks Concepts

VPN - Remote Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN, MPLS-operation, Routing, tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P Connections.

Recent Trends in High Speed Networks

Enabling Differentiated Services using Generalized Power Control Model in Optical Networks - Adaptive Quality of Service Based Power Management - New Worm Exploiting IPV6 and IPV4 - IPV6 - Dual stack Networks - Methodologies and Tools for Exploring Transport Protocols in the Context of High speed Networks - End-to-end Congestion Control for High Speed Networks Based on Population Ecology Models.

REFERENCES

1. W.Stallings, “High Speed Networks and Internet”, Pearson ed., 1999.
2. R.O.Onvural, “ATM Networks-Performance Issues”, Artech House, 1995.
3. David E. McDysan, Dave Paw. “ATM & MPLS Theory & Application: Foundations of Multi Service Networking” DOI:10.1036 0072228377;McGraw-Hill publication.
4. Walrand J. Varatya, High performance communication network Morganb Kaufmann – Harcourt Asia Pvt. Ltd. 2nd Edition, 2000
5. Jeffrey G. Andrews. Anuradha Ghosh. Rias M Uhamed, “Fundamentals of WiMAX understanding broadband Wireless Networking”,Prentice Hall,ISBN:0-13-222552-2
6. Fred Halsall and Lingana Gouda Kulkarni, “Computer Networking and the Internet” fifth edition, Pearson education.

COURSE OUTCOMES

On completion of this course the students will be able to

1. Understand various High speed networks.
2. Understand ATM Protocol architecture and Traffic Management.
3. Understand clearly the working of MPLS
4. Acquire the basics of Advanced Network Concepts and Recent trends in High Speed Networks.
5. Gather Ideas in latest research areas in MPLS

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓							✓			✓
CO3		✓				✓					✓	
CO4	✓	✓							✓			
CO5				✓		✓			✓			

ECCSPESC	VIRTUAL PRIVATE NETWORKS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To study the fundamentals of VPN
- To study the types of VPN and tunneling protocols for security.
- To learn about network security in many layers and network management.
- To impart knowledge on VPN protocols and MPLS VPN.
- To study the applications of VPN

Introduction

Introduction to VPN, VPN devices, Types of VPN - Access VPN, Intranet VPN, Extranet VPN, Overlay and Peer-to-peer VPNs, Connection-oriented and connectionless VPNs, Trusted and Secure VPNs-VPN Provisioning - Service provider and customer provisioned VPNs.

Layer 2 and Layer 3 VPN

Layer 2 Internetworking, VPN Service, - Benefits of L2VPN, Inter-AS L2VPN, Supported IETF Standards-Technology Overview-Intranet Corporate-Internet Access-Scaling MPLS VPNs to Multi-AS, Multi-Provider, and Hierarchical Networks-Heterogeneous Networks-Managed Central Services.

VPN and Firewalls

Secure VPN Technologies, Trusted VPN Technologies, VPN/Firewall Architecture, VPN/Firewall Security Policy, Advanced Security Policy and System Management Hybrid VPN Technologies, Site-to-Site VPN, Remote Access VPN.

MPLS and MPLS VPN

WAN Topologies- Standard IP based Switching – CEF based Multi-Layer switching-MPLS Characteristics- Frame Mode MPLS Operation – MPLS VPN.

VPN Protocols

VPN Protocols, Layer 2 Tunneling Protocol, Internet Protocol Security, Internet Key Exchange (IKE) Protocol, VPN Hacking, Voice over IP Attack – Authentication Header-Encapsulation Security Payload (ESP) - IPSEC Protocol Suite – Generic Routing Encapsulation (GRE).

REFERENCES

1. Ruixi Yuan and Timothy Strayer W., “Virtual Private Networks: Technologies and Solutions”, Addison-Wesly, 2001.
2. Thaddeus Fortenberry, “Windows 2000 Virtual Private Networking”, Macmillan Technical Pub, 2007.
3. Roger J. Sutton, “Secure Communications: Applications and Management”, WILEY, 2002.
4. Don J. Torrieri, “Principles of secure communication systems”, 2nd Eedition, Artech House Publishers, 1992.

COURSE OUTCOMES

On completion of this course the students will be able to

1. Understand the types of VPN and tunneling protocols for security.
2. Familiarize about network security in many layers and network management.
3. Acquire knowledge on VPN protocols and MPLS VPN.
4. Collect designs and applications of VPN
5. To have knowledge in network management

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓						
CO2	✓	✓							✓			
CO3		✓	✓	✓								
CO4	✓		✓	✓		✓				✓		✓
CO5	✓		✓	✓		✓			✓			

ECCSPESC	ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the concepts related to Electromagnetic interference in PCBs
- To provide solutions for minimizing EMI in PCBs
- To learn EMI standards in the design of PCBs
- To learn various EMI coupling principles, EMI standards and measurements
- To provide knowledge on EMI control techniques and design procedures to make EMI compatible PCBs

EMI/EMC Concepts

EMI-EMC definitions and Units of parameters; Sources and victim of EMI; Conducted and Radiated EMI Emission and Susceptibility; Transient EMI, ESD; Radiation Hazards.

EMI Coupling principles

Conducted, radiated and transient coupling; Common ground impedance coupling ; Common mode and ground loop coupling ; Differential mode coupling ; Near field cable to cable coupling, cross talk ; Field to cable coupling ; Power mains and Power supply coupling.

EMI Control Techniques

Shielding, Filtering, Grounding, Bonding, Isolation transformer, Transient suppressors, Cable routing, Signal control.

EMC Design of PCBs

Component selection and mounting; PCB trace impedance; Routing; Cross talk control; Power distribution decoupling; Zoning; Grounding; VIAs connection; Terminations.

EMI Measurements and Standards

Open area test site; TEM cell; EMI test shielded chamber and shielded ferrite lined anechoic chamber; Tx /Rx Antennas, Sensors, Injectors / Couplers, and coupling factors; EMI Rx and spectrum analyzer; Civilian standards-CISPR, FCC, IEC, EN; Military standards.

REFERENCES

1. V.P.Kodali, ―Engineering EMC Principles, Measurements and Technologies‖, IEEE Press, Newyork, 1996.
2. Henry W.Ott.,‖Noise Reduction Techniques in Electronic Systems‖, A Wiley Inter Science Publications, John Wiley and Sons, Newyork, 1988.
3. Bemhard Keiser, ―Principles of Electromagnetic Compatibility‖, 3rd Ed, Artech house, Norwood, 1986.
4. C.R.Paul,‖Introduction to Electromagnetic Compatibility‖ , John Wiley and Sons, Inc, 1992.
5. Don R.J.White Consultant Incorporate, ―Handbook of EMI/EMC‖ ,Vol I-V, 1988.

COURSE OUTCOMES

1. Analyze Electromagnetic interference effects in PCBs
2. Propose solutions for minimizing EMI in PCBs
3. Analyze Electromagnetic environment, EMI coupling, standards and measurement
4. Understand the concepts of control techniques

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓	✓			✓				✓		
CO2			✓	✓		✓			✓	✓		
CO3	✓	✓	✓			✓		✓	✓			
CO4	✓	✓		✓								✓

ECCSPESC	ADVANCED ELECTROMAGNETIC THEORY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce the students about the transmission lines and wave guides.
- To discuss about the theory of microstrips and strip lines.
- To obtain a broad understanding of surface waveguides
- To study the theory of microwave cavities.
- To study the orthogonal properties

Transmission Lines

General solutions for TEM, TE and TM waves obtained from reduced Maxwell's Equations. In homogeneously filled parallel plate transmission-line: Derivation of E.M. fields for the dominant E-mode followed by low-frequency and high frequency solutions.

Waveguides

General solutions for E_{nm} and H_{nm} modes in a rectangular waveguide; including waveguide parameters. Anisotropic dielectrics -Power for H_{nm} modes. Derivation of the attenuation constant for the H_{io} or H_{10}mode.TE_{mo} modes of a partially loaded waveguide, TE_{nm} and TM_{nm} modes in a circular waveguide, TE_{nm} modes in a coaxial transmission line.

Microstrips and Strip Lines

Vector and scalar potential function formulation for microstrip transmission line with anisotropic substrate material - Low frequency solutions; inductance per unit length; capacitance per unit length; propagation constant; and the characteristic impedance - An approximate electrostatic solution for Microstrip Transmission line with perfectly conducting walls;

equivalent dielectric constant - Microstrip attenuation - An approximate electrostatic solution for an enclosed strip-line.

Surface Waveguides

TE_n and TM_n modes of a grounded dielectric slab surface waveguide. Phase, group and energy flow velocities. An introduction to Ridge Waveguides and FIN lines. E.M. fields: Resonant frequencies and Q for TE_{10l} modes of a rectangular cavity.

Microwave Cavities

Electromagnetic fields; resonant frequencies and Q for TE_{nml} modes of a circular cavity.$TE_{01\delta}$ mode of the cylindrical dielectric resonator. Fabry-Perot resonators - A general microwave cavity - Cavity field expansion in terms of short circuit modes. Electric field expansion in a general cavity; Orthogonality properties. Magnetic field expansion in a general cavity; Orthogonality properties.

REFERENCES

1. Prof. Robert E. Collin, "Foundations for Microwave Engineering", Second Edition; McGraw Hill International Edition, Second Edition, 2000.
2. Prof. David M. Pozar "Microwave Engineering "; Second Edition; John Wiley & Sons; Inc. Third Edition, 2004.

COURSE OUTCOMES

On completion of this course the students will be able to

1. Understand clearly about the transmission lines and wave guides
2. Familiarize about the theory of micro strips and strip lines
3. Understand broadly about surface waveguides and microwave cavities
4. Understand the microwave cavities.
5. Know about the orthogonal properties and its uses in Waveguides

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓				✓						
CO2						✓		✓				
CO3			✓			✓		✓			✓	
CO4			✓	✓								✓
CO5	✓	✓	✓	✓		✓						✓

ECCSPESC	RF COMMUNICATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the fundamental concepts of RF wireless communications.
- To explore the students about the protocols and modulation techniques.
- To introduce transmitter and receiver system design techniques and analysis.
- To understand the basics of radio system design and applications.
- To study about WLAN

Introduction

Elements of Wireless communications – Mechanism of Radio wave propagation-Open field propagation – Diffraction – Scattering – Path loss - Multipath Phenomena – Flat fading - Diversity technique – Noise.

Antennas and Transmission Lines -Antenna characteristics-Types of antennas- Impedance matching – Measuring techniques.

Communication Protocols and Modulation

Base band data format & protocol – Base band coding – RF frequency & Bandwidth – Modulation and Demodulation: Phase shift keying - Nyquist bandwidth - QPSK constellation diagram and 16- QAM constellation diagram-Spread spectrum: Frequency hopping spread spectrum & direct sequence spread spectrum– RFID.

Transmitters and Receivers

Transmitters - RF Source: Saw resonators & oscillators, Crystal oscillators, Synthesizer control – Modulation: ASK & FSK of Saw oscillators – Amplifiers – Filtering – Antenna Receivers - Tuned radio frequency – Super regenerative receiver – Super heterodyne receiver – Direct conversion receiver – Digital receivers – Repeaters.

Radio System Design

Range of radio system – Sensitivity – Finding range from sensitivity - Super heterodyne image & spurious response – Inter modulation distortion and dynamic range – Demodulation – Internal receiver noise – transmitter design – Bandwidth – Antenna Directivity – Power source.

Applications and Technologies

Wireless local area network (WLAN): Wi-Fi, Network architecture, IEEE 802.11 a, b, HIPERLAN – Bluetooth: Transceiver and timing – Zigbee: Architecture, characteristics, Frame structure, applications, comparison of Bluetooth with Zigbee – Conflict and Compatibility – Ultra wideband technology.

REFERENCES

1. Alan Bensky, “Short Range Wireless Communication Fundamentals of RF System Design and Application”, II edition, 2004.
2. T.S. Rappaport, “Wireless Communications”, Pearson Education, 2003.
3. Jon B. Hagen, “Radio Frequency Electronics”, Cambridge University press, Cambridge, 1996.
4. Ian Hickman, “RF Hand Book”, Butter Worth Heinemann Ltd., Oxford, 1993.

COURSE OUTCOMES

On completion of this course, the students will be able to

1. Understand the basic concepts of RF wireless communications
2. Acquire the detail view of communication protocol
3. Analyze and design various transmitters and receivers
4. Understand the basics of radio system design and applications
5. To Gain knowledge in Ultra Wide Band technology and its applications

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓	✓									
CO3	✓		✓	✓		✓			✓			
CO4	✓		✓	✓		✓						
CO5	✓	✓	✓	✓		✓			✓			

ECCSPESC	ADVANCED DIGITAL IMAGE PROCESSING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the image fundamentals and mathematical transforms necessary for image processing and to study the image enhancement techniques.
- To understand the image segmentation and representation techniques.
- To understand how image are analyzed to extract features of interest.
- To introduce the concepts of image registration and image fusion.
- To analyze the constraints in image processing when dealing with 3D data sets.

Fundamentals of Digital Image Processing

Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, 2D image transforms DFT, DCT, KLT, and SVD. Image enhancement in spatial and frequency domain, Review of morphological image processing.

Segmentation

Edge detection, Thresholding, Region growing, Fuzzy clustering, Watershed algorithm, Active contour methods, Texture feature based segmentation, Model based segmentation, Atlas based segmentation, Wavelet based Segmentation methods.

Feature Extraction

First and second order edge detection operators, Phase congruency, Localized feature Extraction detecting image curvature, shape features Hough transform, shape skeletonization, Boundary descriptors, Moments, Texture descriptors Autocorrelation, Co-occurrence features, Run length features, Fractal model based features, Gabor filter, wavelet features.

Registration and Image Fusion

Registration Preprocessing, Feature selection points, lines, regions and templates Feature correspondence Point pattern matching, Line matching, region matching Template matching, Transformation functions Similarity transformation and Affine Transformation. Resampling Nearest Neighbour and Cubic Splines Image Fusion Overview of image fusion, pixel fusion, Multiresolution based fusion discrete wavelet transform, Curvelet transform. Region based fusion.

3D Image Visualization

Sources of 3D Data sets, Slicing the Data set, Arbitrary section planes, The use of color, Volumetric display, Stereo Viewing, Ray tracing, Reflection, Surfaces, Multiply connected surfaces, Image processing in 3D, Measurements on 3D images.

REFERENCES

1. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, Pearson, Education, Inc., Second Edition, 2004.
2. Anil K. Jain, Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.
3. Rick S. Blum, Zheng Liu,“ Multisensor image fusion and its Applications“, Taylor & Francis,2006.

COURSE OUTCOMES

On completion of the course, the students will be able to

1. To understand image formation and the role human visual system play in perception of gray and color image data.
2. To apply image processing techniques in both the spatial and frequency domains.
3. To design image analysis techniques in the form of image segmentation and to evaluate the methodologies for segmentation.
4. To understand the concepts of image registration and image fusion.
5. To have knowledge in developing coding for 3D images based on its applications

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓	✓			✓						
CO3			✓	✓	✓	✓						
CO4	✓		✓						✓			
CO5	✓	✓		✓		✓			✓			

ECCSPESC	DIGITAL VIDEO PROCESSING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE

- To introduce the fundamentals of video processing.
- To study the concepts of motion estimation and its general methodologies.
- To learn the basics of video coding and its methods.
- To understand the error control techniques in video processing
- To study the applications of video processing in the wireless networks.

Introduction to Video Processing

Principles of colour video processing - Video display - Composite versus component video - Progressive and interlaced scan - Sampling of video signals.

Motion Estimation

Two dimensional - Optical flow - General methodologies - Pixel based motion estimation - Block matching algorithm - Deformable block matching algorithm - Mesh based motion - estimation - Global motion estimation - Region based motion estimation - Multiresolution - motion estimation - Three dimensional - Feature based Motion Estimation - Direct motion – Estimation - Iterative model.

Basic of Video Coding

Categorization of video coding schemes - Information Theory for source coding - Binary encoding - Scalar quantization - Vector quantization - Wave form based coding - Block-based transform coding - Predictive coding - Temporal prediction and transform coding.

Error Control in Video Communications

Overview of approaches - Video applications and communication – networks - Transport level error control - Error resilient encoding - Decoder error concealment - Encoder-decoder interactive error control - Error resilience Tools in H.263 and MPEG-4.

Streaming Video over the Internet and Wireless IP Networks

Architecture for video streaming systems - Video compression - Application layer QoS control for streaming – video Continuous media Distribution services - Streaming servers - Media synchronization - Protocols for streaming video - Streaming video over wireless IP networks.

REFERENCES

1. Yao Wang, Jorn Ostermann, Ya-Qin Zhang, 'Video Processing and Communications', Prentice Hall, 2002.
2. Alan C. Bovik, 'The Essential Guide to Video Processing', Elsevier Science, second edition, 2009.
3. Jens R. Ohm, 'Multimedia Communication Technology: Representation, Transmission and Identification of Multimedia Signals , Springer, 2004.
4. M. E. Al-Mualla, C. N. Canagarajah and D. R. Bull, "Video Coding for Mobile

5. Communications: Efficiency, Complexity and Resilience", Elsevier Science, Academic Press, 2002.
A. Murat Tekalp, 'Digital Video Processing', Prentice Hall, edition 1, 1996.

COURSE OUTCOMES

On completing this course the students should be able to:

1. Understand the basic concepts and characteristics of video processing.
2. Understand the concepts of motion estimation and basics of video coding.
3. Analyze the error control in video communications and its applications.
4. Understand the basics of video compression and its applications in the wireless networks.
5. Gain knowledge in the applications of video processing in the wireless networks

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓										
CO2		✓										
CO3		✓	✓	✓		✓						
CO4	✓	✓	✓	✓		✓						
CO5	✓	✓	✓			✓			✓			

ECCSPESC	**WIRELESS COMMUNICATION NETWORKS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES

- To understand the various terminologies, principles used in wireless communication networks.
- Overview of wireless communication networks area and its application.
- To appreciate the contribution of wireless communication networks to technological growth.
- To study the theory of Ad-Hoc wireless networks
- To compare various wireless networks

Physical and Wireless MAC Layer Alternatives

Wired transmission techniques- design of wireless modems, power efficiency, out of band radiation, applied wireless transmission techniques, short distance base band transmission, UWB pulse transmission, broad Modems for higher speeds, diversity and smart receiving techniques, random access for data oriented networks, integration of voice and data traffic.

Wireless Network Planning and Operation

Wireless networks topologies, cellular topology, cell fundamentals signal to interference ratio calculation, capacity expansion techniques, cell splitting, use of directional antennas for cell sectoring, micro cell method, overload cells, channels allocation techniques and channel borrowing techniques, DCA, mobility management, radio resources and power management securities in wireless networks.

Wireless Personal Area Networks

Introduction to Bluetooth, WPAN Device Architecture, Protocol Stack, Network Connection Establishment, Topology Applications, Low Rate and High Rate WPAN, Wireless Sensor Network, Protocol Stack, IEEE 802.15.3Zig bee Technology – IEEE 802.15.4 Ultra Wideband.

Wireless Local Area Networks

Introduction to Wireless LANs, LAN Equipment, Topologies, Technologies, Architecture and Services, MAC Sub Layer – IEEE 802.11Standards, Interference between Bluetooth and IEEE 802.11, HIPERLAN, Introduction to IEEE 802.16, 802.22, Rural Area Networks – Wi-Max Protocols.

Ad-Hoc Wireless Networks

Characteristics of Ad-hoc Networks, Classifications of MAC Protocols-Table driven and Source initiated On Demand routing protocols, DSDV, AODV, DSR, Hybrid Protocols, TCP over Ad-hoc Wireless Networks.

REFERENCES

1. Kaveh Pahlavan, Prashant Krishnamoorthy, "Principles of Wireless Networks", A United Approach – Pearson Education, 2002.
2. X.Wang and H.V.Poor, "Wireless Communication Systems", Pearson education, 2004.
3. M.Mallick, "Mobile and Wireless design essentials", Wiley Publishing Inc. 2003.
4. P.Nicopolitidis, M.S.Obaidat, G.I. papadimitria, A.S. Pomportsis, "Wireless Networks", John Wiley & Sons, 2003.
5. T.S. Rappaport, "Wireless Communications", Pearson Education, 2003.

COURSE OUTCOMES

On completion of this course, the students will be able to

1. Analyze the design considerations of wireless MAC layer.
2. Formulate wireless network planning and operation techniques.
3. Discuss various WLAN and WWAN standards.
4. Analyze the design considerations of wireless networks.
5. Compare various wireless networks based on its performance.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓		✓						
CO2	✓	✓		✓		✓			✓			
CO3	✓		✓	✓								
CO4	✓		✓	✓		✓						
CO5	✓			✓	✓	✓			✓			

ECCSPESC	VLSI FOR WIRELESS COMMUNICATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To study the design concepts of low noise amplifiers.
- To study the various types of mixers designed for wireless communication.
- To study and design PLL and VCO.
- To understand the concepts of CDMA in wireless communication.
- To learn about next generation CDMA system.

Components and Devices

Integrated inductors, resistors, MOSFET and BJT AMPLIFIER DESIGN: Low Noise Amplifier Design - Wideband LNA - Design Narrowband LNA - Impedance Matching - Automatic Gain - Control Amplifiers – Power Amplifiers

Mixers

Balancing Mixer - Qualitative Description of the Gilbert Mixer - Conversion Gain – Distortion – Low Frequency Case: Analysis of Gilbert Mixer – Distortion - High-Frequency Case – Noise – A Complete Active Mixer. Switching Mixer - Distortion in Unbalanced Switching Mixer – Conversion Gain in Unbalanced Switching Mixer - Noise in Unbalanced Switching Mixer – A Practical Unbalanced Switching Mixer. Sampling Mixer - Conversion Gain in Single Ended Sampling Mixer - Distortion in Single Ended Sampling Mixer - Intrinsic Noise in Single Ended Sampling Mixer - Extrinsic Noise in Single Ended Sampling Mixer.

Frequency Synthesizers

Phase Locked Loops - Voltage Controlled Oscillators - Phase Detector – Analog Phase Detectors – Digital Phase Detectors - Frequency Dividers - LC Oscillators - Ring Oscillators - Phase Noise - A Complete Synthesizer Design Example (DECT Application).

Sub Systems

Data converters in communications, adaptive Filters, equalizers and transceivers.

Implementations

VLSI architecture for Multitier Wireless System - Hardware Design Issues for a Next generation CDMA System.

REFERENCES

1. B.Razavi ,"RF Microelectronics" , Prentice-Hall ,1998.
2. Bosco H Leung "VLSI for Wireless Communication", Pearson Education, 2002.
3. Thomas H.Lee, "The Design of CMOS Radio –Frequency Integrated Circuits', Cambridge University Press ,2003.
4. Emad N Farag and Mohamed I Elmasry, "Mixed Signal VLSI Wireless Design - Circuits and Systems", Kluwer Academic Publishers, 2000.
5. Behzad Razavi, "Design of Analog CMOS Integrated Circuits" McGraw-Hill, 1999.
6. J. Crols and M. Steyaert, "CMOS Wireless Transceiver Design," Boston, Kluwer Academic Pub., 1997.

COURSE OUTCOMES

Upon completion of the course the students will be able to

1. Know the basics of MOSFET and BJT design.
2. Understand the types of mixtures and its characteristics.
3. Understand frequency synthesizers and sub systems.
4. Understand the hardware implementation in wireless systems.
5. Understand the next generation CDMA and its applications.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓	✓	✓	✓						
CO2	✓	✓							✓			
CO3	✓	✓	✓									
CO4	✓		✓	✓		✓						
CO5	✓	✓	✓	✓		✓			✓			

ECCSPESC	FPGA BASED WIRELESS COMMUNICATION SYSTEM DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To enable the students to learn about the FPGA architecture and the programming technologies.
- To introduce to the students the modeling techniques of VHDL.
- To evaluate the performance using simulation and testing of systems.
- To study the concept behind software radio and the design of digital signal processing blocks.
- To learn the applications of FPGA on communication system

FPGA Architecture and Programming Technologies

Field Programmable gate arrays- Logic blocks, routing architecture, Design flow technology – mapping for FPGAs, Xilinx XC4000 – ALTERA's FLEX 8000/10000, ACTEL's ACT-1,2,3 and their speed performance Case studies: Altera MAX 5000 and 7000 – Altera MAX 9000 – Spartan II and Virtex II FPGAs – Apex and Cyclone FPGAs. Programming Technologies: Antifuse – static RAM – EPROM and EEPROM technology.

Verilog HDL

Data types and operators – Gate Level Modeling – Data Flow Modeling – Behavioral Modeling-structural modeling –Design of combinational logic and sequential logic circuits-Design of Memory module and Finite state machines-test benches.

Logic Synthesis, Simulation and Testing

Design systems – Logic Synthesis – types of simulation –boundary scan test – fault simulation – automatic test pattern generation.

Software Radio

Block Diagram of Software Radio –Numerically controlled oscillator – Digital Up converters / Down Converters – Sampling schemes-Coherent Modulator and Demodulator – Incoherent Demodulation – digital approach for I and Q generation- Filter design (CIC) – baseband processing techniques.

System Design

Design of Digital signal processing blocks – FFT, IFFT, FIR filters – crest factor reduction, digital pre distortion blocks – Turbo coders – OFDM modulators/demodulators, Network security – AES encryption – decryption modules – SOC design – Design Methodologies – Processes and Flows.

REFERENCES

1. M.J.S.Smith, "Application Specific Integrated Circuits, Addison –Wesley Longman Inc., 1997.
2. Parag. K. Lala, Digital System Design using Programmable Logic Devices , BSP, 2003.
3. Samir Palnitkar, " Verilog HDL: A Guide to Digital Design and Synthesis", Prentice Hall, 2003.
4. Jeffrey H Reed, "Software Radio: A Modern Approach to Radio Engineering", Prentice Hall, 2002.
5. Uwe Meyer Baese, "Digital Signal Processing with Field Programmable Gate Arrays", Springer, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

1. Familiarize about the FPGA architecture and the programming technologies.
2. Understand syntax and semantics of Verilog HDL.
3. Evaluate the performance using simulation and testing of systems

4. Acquire the concept behind software radio and the design of digital signal processing blocks.
5. Collect ideas on the applications of FPGA on communication system.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓										
CO2	✓	✓							✓			
CO3	✓	✓	✓		✓	✓						
CO4	✓	✓	✓	✓		✓						
CO5	✓	✓		✓					✓			

ECCSPESC	ERROR CONTROL CODING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To introduce the fundamentals of error correcting codes.
- To study the concepts of linear block codes.
- To learn the basics of cyclic codes, Syndrome Encoding Circuit and BCH codes
- To understand the error correction / detection techniques in Convolutional codes
- To study the burst error correcting codes and error correcting / detecting systems.

Introduction to Coding

Brief description of a digital communication system, Cause of errors and need for error control coding, broad classes of error and classes of error correcting codes, general expression of the probability of error in a binary symmetric Gaussian channel, Principle of maximum likelihood decoding - Block Codes - Decoding Tables.

Turbo codes-Introduction-Encoding-Decoding of Turbo codes-Distance Properties of Turbo codes-Convergence of Turbo codes-HARQ schemes in Turbo codes.

Linear Block Codes

Definitions - Generator Matrix - Parity-Check Matrix - Error-Correcting - Capability of a Linear Code - Syndrome- definition, most likelihood principle of error detection - Hamming distance, minimum distance, minimum weight, error detecting & error correcting capabilities - The Standard Array - Construction, Error Detection with Syndrome.

Cyclic Codes

Description of Cyclic Codes - Encoding with (n-k)-Stage Shift Register - Definition, generator polynomial, properties of cyclic code and generator polynomial - Generator matrix, parity check matrix, their properties and interrelations - Design and operation of encoder - Design and operation of syndrome circuit - Cyclic Hamming code.

BCH Codes and LDPC Codes

Description of Codes - Decoding of the BCH Codes - Implementation of Error Correction
Non-binary BCH Codes and Reed-Solomon Codes

Low Density Parity Check Codes-Introduction-Encoding –Decoding of LDPC codes-Belief Propagation Algorithm on BSC and AWGN channel.

Convolutional codes

Definition, encoder, generator sequences, generator matrix, principle of constructing code words, numerical examples, code rate, constraint length, fractional rate loss - Finite state machine analysis of coder, state diagram, code tree, Trellis - Principle of maximum likelihood

decoding of convolutional code, Viterbi algorithm, Error Detection / Correction using Trellis codes - Simulation tests of for data transmission through Gaussian binary symmetric channel - Distance properties of convolutional codes.

Burst Error Correcting Codes:

Shortened cyclic code, Hadamard code, Golay code, Kasami decoder - Single-Burst-Error-Correcting Codes - Burst-and-Random-Error-Correcting Codes – Error Detecting and Correcting Systems Design and Hardware Implementation

REFERENCES

1. Shu Lin, "An Introduction to Error-Correcting Codes", Prentice-Hall
2. Shu Lin, Daniel J. Costello, Jr. Error Control Coding Fundamentals and Applications, Prentice Hall.
3. Wakerly, John, "Error Detecting Codes, Self-Checking Circuits and Applications."
4. Peterson, W. W. and E.J. Weldon, Jr., "Error-Correcting Codes", the M.I.T. Press, Cambridge, MA 1970.
5. Roft Johannesson and K. S. Zigangirov, “Fundamentals of Convolutional Coding”
6. Gareth A. Jones & J. Mary Jones, “Information and Coding Theory”, Springer.
7. Richard B. Wells, “Applied Coding and Information Theory for Engineers”, Pearson Education
8. Salvatore Gravano, “Introduction to Error Control Codes” Oxford.

COURSE OUTCOMES

After completing this course the students should be able to:

1. Understand Block Codes and Maximum Likelihood Decoding.
2. Understand Decoding Tables, Hamming Weight and Distance and Error Correction vs Detection.
3. Understand Generator Matrix, Parity-Check Matrix and Error-Correcting Capability of a Linear Code.
4. Understand Binary Cyclic Codes, encoding with (n-k)-Stage Shift Register and Syndrome Calculations and Error Detection.
5. Understand BCH Codes and the encoding / decoding techniques.
6. Understand Burst Error Codes and its applications.

Mapping Course Outcomes (COs) with Programme Outcomes (POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓						✓				
CO2		✓	✓						✓	✓		
CO3		✓	✓	✓		✓						
CO4	✓	✓	✓	✓				✓		✓	✓	
CO5	✓	✓	✓	✓								
CO6	✓	✓	✓		✓		✓		✓			

OPEN ELECTIVES

ECCSOESC	BUSINESS ANALYTICS	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- Understand the role of business analytics within an organization.
- Analyze data using statistical and data mining techniques and understand relationships
- between the underlying business processes of an organization.
- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
- To become familiar with processes needed to develop, report, and analyze business data.
- Use decision-making tools/Operations research techniques.
- Mange business process using analytical and management tools.
- Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

Business analytics

Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

Trendiness and Regression Analysis

Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

Organization Structures of Business analytics

Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

Forecasting Techniques

Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

Decision Analysis

Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.

Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

REFERENCES

1. Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Businessanalytics Principles, Concepts, and Applications, Pearson FT Press.
2. James Evans, Business Analytics, Persons Education.

COURSE OUTCOMES

1. Students will demonstrate knowledge of data analytics.

2. Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
3. Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
4. Students will demonstrate the ability to translate data into clear, actionable insights.
5. To become familiar with processes needed to develop, report, and analyze business data

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2									✓			
CO3			✓		✓	✓		✓			✓	
CO4	✓	✓	✓	✓		✓		✓				
CO5	✓	✓		✓				✓	✓			

ECCSOESC	INDUSTRIAL SAFETY	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To Understand the concept of Industrial Safety
- To Provide useful practical knowledge for work place safety
- To Identify, Evaluate and control all the hazards to prevent people from mitigate harm.

Industrial safety

Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and fire fighting, equipment and methods.

Fundamentals of maintenance engineering

Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Wear and Corrosion and their prevention

Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Fault tracing

Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Periodic and preventive maintenance

Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

REFERENCES

1. Higgins & Morrow, Maintenance Engineering Handbook, Da Information Services.
2. H. P. Garg, Maintenance Engineering, S. Chand and Company.
3. Audels, Pump-hydraulic Compressors, Mcgrew Hill Publication.
4. Winterkorn, Hans, Foundation Engineering Handbook, Chapman & Hall London.

COURSE OUTCOMES

1. Understanding of Safety principles.
2. Ability to do Hazard analysis.
3. Ability to do event tree and fault tree analysis.
4. Maintenance of mechanical and electrical instruments
5. Understanding the concept and Importance of repair recycle.

Mapping Course Outcomes (COs) with Programme Outcomes (POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓						✓				
CO2									✓	✓		
CO3						✓						
CO4	✓			✓							✓	
CO5			✓									✓

ECCSOESC	**OPERATIONS RESEARCH**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

COURSE OBJECTIVES

- To Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
- To Conduct and interpret post-optimal and sensitivity analysis and explain the primal-dual relationship.
- To Develop mathematical skills able to carry out sensitivity analysis

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

REFERENCES

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

COURSE OUTCOMES

At the end of the course, the student should be able to

1. Students should able to apply the dynamic programming to solve problems of discrete and continuous variables.
2. Students should able to apply the concept of non-linear programming
3. Students should able to carry out sensitivity analysis
4. Student should able to model the real world problem and simulate it.

Mapping Course Outcomes (COs) with Programme Outcomes (POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓						✓				
CO2									✓	✓		
CO3						✓						
CO4	✓										✓	

ECCSOESC	COST MANAGEMENT OF ENGINEERING PROJECTS	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To reduce the costs expended by an organization while strengthening the strategic position of the firm.
- To help streamline the transactions between corporate support departments and the operating units.
- To co-ordinate the buyer –supplier interactions by devise transfer pricing systems.
- To manage cost and also enhance profit consciousness.

Introduction and Overview of the Strategic Cost Management Process

Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Project

Project meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of

technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents

Project team

Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Cost Behavior and Profit Planning Marginal Costing

Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis.

Budgetary Control

Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing. Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

REFERENCES

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

COURSE OUTCOMES

At the end of the course, the student should be able to

1. Understand cost accounting knowledge, such as terminology and fundamental principles and methods.
2. Apply course material to new situations.
3. Solve problems and make decisions based on the results of the solutions to the problems.

Mapping Course Outcomes (COs) with Programme Outcomes (POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓		✓					✓				
CO2	✓				✓		✓			✓		✓
CO3		✓				✓						✓

ECCSOESC	**COMPOSITE MATERIALS**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

COURSE OBJECTIVES

- To train students to be able to design composite structures.
- To select composite materials and conduct stress analysis of selected practical applications.

- To be familiar with the properties and response of composite structures.
- To illuminate the knowledge and analysis skills and applying basic laws in mechanics to the composite materials.

Introduction

Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

Reinforcements

Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

Manufacturing of Metal Matrix Composites

Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

Manufacturing of Polymer Matrix Composites

Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

Strength

Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

REFERENCES

1. Danial Gay, Suong V. Hoa, and Stephen W. Tasi, Material Science and Technology – Vol 13 – Composites, VCH, West Germany.
2. WD Callister, Jr., Adapted by R. Balasubramaniam, Materials Science and Engineering, An introduction. John Wiley & Sons, NY, Indian edition, 2007.
3. Ed-Lubin, Hand Book of Composite Materials
4. K.K.Chawla, Composite Materials.
5. Deborah D.L. Chung, Composite Materials Science and Applications.
6. Danial Gay, Suong V. Hoa, and Stephen W. Tasi, Composite Materials Design and Applications.

COURSE OUTCOMES

At the end of the course, the student should be able to

1. Explain the mechanical behaviour of layered composites compared to isotropic materials.
2. Apply constitutive equations of composite materials and understand mechanical behaviour at micro and macro levels.
3. Determine stresses and strains relation in composite materials

Mapping Course Outcomes (COs) with Programme Outcomes (POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			✓					✓				
CO2	✓			✓	✓					✓		
CO3		✓										✓

ECCSOESC	WASTE TO ENERGY	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To enable students to understand the concept of waste to energy.
- To link legal, technical and management principles for production of energy from waste
- To learn about the best available technologies for waste to energy.
- To facilitate the students in developing skills in the decision making process.

Introduction to Energy from Waste

Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Biomass Pyrolysis

Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Biomass Gasification

Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Biomass Combustion

Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Biogas

Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production -Urban waste to energy conversion - Biomass energy programme in India.

REFERENCES

1. Desai, Ashok V., Non Conventional Energy, Wiley Eastern Ltd., 1990.
2. Khandelwal, K. C. and Mahdi, S. S., Biogas Technology - A Practical Hand Book - Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Challal, D. S., Food, Feed and Fuel from Biomass, IBH Publishing Co. Pvt. Ltd., 1991.
4. Y. WereKo-Brobby and E. B. Hagan, Biomass Conversion and Technology, John Wiley & Sons, 1996.

COURSE OUTCOMES

At the end of the course, the student should be able to

1. Apply the knowledge about the operations of waste to energy plants.
2. Analyze the various aspects of waste to energy management systems.
3. Carryout Techno-economic feasibility for waste to energy plants.
4. Apply the knowledge in planning and operations of waste to energy plants.

Mapping Course Outcomes (COs) with Programme Outcomes (POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓		✓					✓				
CO2	✓			✓	✓					✓		✓
CO3		✓										✓
CO4			✓									

ECCSOESC	WIRELESS INTELLIGENT NETWORKS	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To enable the students to study the fundamentals of mobile communication concepts
- To enable the students to study the fundamentals of wireless intelligent networking standards.
- To introduce the concept of intelligent networking and migration from point solutions to network based solutions.
- To expose the students to WIN services, architectures
- To learn Advantages and applications of Wireless Intelligent Networking.

Fundamentals of Mobile Communications

Fundamental Mobile Communication Concepts – Wireless System Architecture – Mobile Network Standards – Wireless Intelligent Networking Standards – Evolution to Third – Generation Wireless Standards – Overview of SS7 Network Signaling – Signaling in a Wireless Network – Intelligent Networking.

Introduction to Cellular Mobile Systems

Spectrum Allocation, Basic Cellular Systems, performance Criteria, Operation of cellular systems, analog cellular systems, digital Cellular Systems. Frequency Reuse, channel assignment strategies, handoff Strategies, Interference and system capacity, tracking and grade off service, improving coverage and capacity

Wireless Intelligent Networking

Origins of Intelligent Networking – Wireless Intelligent Networking, WIN, CAMEL – Relationship of wireless Intelligent Networking Standards – Migration from Point solutions to Network- Based Solutions – Impetus for Migration, Advantages and Operational Challenges of Network – Based Solutions.

WIN Capabilities

Intelligence in Telecommunication Networks – Fixed Network Intelligence – Mobile Network Intelligence– Standardized Intelligence for Mobile Networks (WIN, CAMEL) – Phased Development of Standards- Pre WIN, WIN Phase – I, II, III, CAMEL – Phase I, II, Trigger detection points – WIN and CAMEL operational Issues.

WIN Services

Intelligent Networking solutions to Wireless Fraud – Pre call Validation – Cloning Fraud – Roamer Verification and Reinstatement – Network Based HLR – Long term Strategic Advantages – Wireless and Wire line Services – Emulation of Basic Wireless Features – Emulation of Wire line IN Services – Integration of Wire line and Wireless Services – Emergence of Wireless Specific Services – Emergence of Data Prominence – Access to Web Information.

REFERENCES

1. Theodre S Rappaport (2009), "Wireless Communications: Principles and Practices", Pearson India
2. Gerry Christensen, Paul G.Florack, Robert Duncan, "Wireless Intelligent Networking", Artech House Publishers 2001.
3. Johan Zuidweg, "Next generation Intelligent Networks", Artech House Communication Library, Edition I, August 15, 2002.

COURSE OUTCOMES

On completion of this course the students will be able to

1. Acquire knowledge about fundamentals of mobile communication
2. Understand the basic concepts in wireless intelligent networks
3. Acquire the concepts in WIN capabilities, services and architecture
4. Collect ideas on latest applications of wireless communication.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓	✓	✓	✓						
CO2		✓										
CO3		✓	✓							✓		
CO4	✓		✓	✓		✓						

ECCSOESC	SYSTEM MANAGEMENT AND SECURITY	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To study fundamentals of network management
- To discuss about the various models for defining the systems.
- To understand the concepts and terminology associated with SNMP.
- To learn to the concepts and architecture behind standards based network management.
- To explore the different encryption methods and security based mechanisms.

Network Management

Organisational Model – Information Model – Communication Model – Encoding Structure – Macros Functional Model – Configuration management - Fault management - Performance management – Event Correlation techniques – Security Management – Accounting Management – Report Management – Policy based Management - Service Level management.

Internet Management

SNMP – Organisational Model – System overview – Information Model – Communication model - Functional Model – SNMP Proxy Server – Management Information – Protocol Remote Monitoring.

Broad Band Network Management

Broad band Networks and Services – ATM technology – VP,VC, ATM Packet – Integrated services – ATM LAN simulation – Virtual LAN – ATM network management – ATM network references Model – Integrated local management interface – ATM management information base – ATM management interface – ATM digital Exchange interface management.

Key Encryption

Conventional Encryption Model – Stegnography – Block Cipher – Encryption algorithms – key distribution – RSA algorithm – Diffie – Hellman Key exchange – Elliptic curve Cryptology – Message Authentication – Digital Signatures – Key management.

System Security

IP Security – Security Architecture – Security Pay load – Web Security requirement – Secure electronic transaction – Dual Signature – Intruders – Viruses – Worms – Trusted Systems – Antivirus Techniques – Digital Immune Systems.

REFERENCES

1. Mani Subramaniar, "Network Management Principles and Practice"–Addision Wesly Newyork.
2. Salah Alidarous, Thomas Plevayk, "Telecommunications network management technologies Implementations ", Eastern Economy Edition, IEEE Press New Delhi 1998.
3. Lakshmi G. Raman "Fundamentals of Telecommunication network Management", Eastern Economy Edition, IEEE Press New Delhi 1999.
4. William Stallings, "Cryptology and network security" 2nd edition PHI New Delhi 1999.

COURSE OUTCOMES

On completion of this course the students will be able to

1. To understand about the various models for defining the systems.
2. To understand the concepts and terminology associated with SNMP.
3. Acquired the concepts and architecture behind standards based network management.
4. To analyze the different encryption methods and security based mechanisms
5. To gain knowledge in Digital Immune systems

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		✓	✓	✓	✓	✓						
CO2		✓										
CO3		✓	✓							✓		
CO4	✓		✓	✓		✓						
CO5	✓	✓	✓	✓		✓	✓		✓			

ECCSOESC	EMBEDDED SYSTEM DESIGN	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To make the students to understand the issues and challenges in embedded system design.
- To know the concepts of embedded processor architecture and memory models.

- To explore the software platform for implementing the embedded system
- To study the different types of peripherals and bus devices.
- To study about Special considerations in an RTOS and CPU management.

Introduction

Introduction to Embedded Computing, Issues and Challenges in Embedded System Design, Trends: SoC, custom designed chips, configurable processors and multi-core processors.

Embedded Processor Architecture

General concepts – Instruction Set Architecture, Levels in architecture, Functional description – hardware/software trade-off Introduction to RISC architecture, pipelining, Instruction issue and execution, Instruction formats, Addressing modes, Data alignment and byte ordering, Introduction to VLIW and DSP processors.

Memory and Cache

Memory model – hierarchy and management - virtual memory concepts, protection, cache and SPM, Introduction to the cache coherency problem. Programming with HCS12**:** C Programming examples for interrupts, UART, Input and Output in HCS12 processor.

Embedded System Software

Components of an embedded software system, system boot up and downloading code, System memory map (allocating sections through linker command file), Programming peripherals and ISRs, Embedded tool chain Mixing C and Assembly- concurrent software- memory management and system initialization.

Peripherals and Bus Devices

SRAM, DRAM, SDRAM, DDR, NOR and NAND Flash, Ethernet, TPU, UART, USB, I2C bus, SPI bus, CAN bus. C Programming examples for Interrupts, I2C, CAN, TPU and Ethernet in Cold Fire processor Embedded Operating Systems: OS-less system, Introduction to RTOS-Special considerations in an RTOS, CPU management.

REFERENCES

1. John. L. Hennessy and David. A. Patterson, “Computer Architecture”, Morgan Kaufmann publisher, Fourth Edition, 2007
2. Sinha, Muthukumar and Darshak, “Embedded System Design – A Practical Approach.
3. Frank Vahid and Tony Givargis, “Embedded system design”, John Wiley & Sons, International Edition 2003.
4. Han-Way Huang, An Introduction to Hardware and Software Interfacing,” The HCS12/9S12.Delmar cengage Learning, First Edition 2005.
5. Michael Barr and Anthony Masasa, “Programming Embedded Systems”. O’relly & Associates Inc. 2006.

COURSE OUTCOMES

On completion of the course the students will be able to

1. Understand the issues and challenges in embedded system design.
2. Acquired the concepts of embedded processor architecture and memory models.
3. Analyze the software platform for implementing the embedded system
4. Get ideas in different types of peripherals and bus devices.
5. Understand the Special considerations in an RTOS and CPU management.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			✓	✓		✓						
CO2											✓	✓
CO3										✓		
CO4	✓		✓	✓		✓						
CO5	✓			✓		✓	✓		✓			

ECCSOESC	MULTIMEDIA COMMUNICATION	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To know about the image enhancement techniques and the image compression procedures.
- To understand the basic concepts of VoIP technology
- To study about multimedia networking.

Multimedia Components

Introduction - Multimedia skills - Multimedia components and their characteristics - Text, sound, images, graphics, animation, video, hardware.

Audio and Video Compression

Audio compression–DPCM-Adaptive PCM –adaptive predictive coding-linear Predictive coding-code excited LPC-perpetual coding, MP3; Video compression – principles-H.261-H.263-MPEG 1, 2, 4.

Lossless Compression

Compression principles-source encoders and destination encoders—entropy encoding –source encoding -text compression –static Huffman coding dynamic coding –arithmetic coding – Lempel Ziv-Welch Compression.

VOIP Technology

Basics of IP transport, VOIP challenges, H.323/ SIP –Network Architecture, Protocols, Call establishment and release, VoIP and SS7, Quality of Service- CODEC Methods-VOIP applicability.

Multimedia Networking

Multimedia networking - Applications - streamed stored and audio -making the best Effort service - protocols for real time interactive Applications - distributing multimedia beyond best effort service - secluding and policing Mechanisms - integrated services differentiated Services - RSVP.

REFERENCES

1. Fred Halshall, “Multimedia communication - applications, networks, protocols and standards”, Pearson education, 2007.
2. Tay Vaughan, “Multimedia: Making it work”, 7/e, TMH, 2007.
3. Kurose and W.Ross, “Computer Networking –A top down approach”, Pearson education, 3rd edition, 2005.
4. KR. Rao, ZS Bojkovic, DA Milovanovic, “Multimedia Communication Systems: Techniques, Standards, and Networks”, Pearson Education 2007.

COURSE OUTCOMES

On completion of this course, the students will be able to

1. Understand clearly about the fundamentals of image processing
2. Gain knowledge of image enhancement techniques and the image compression procedures.
3. Understand about VOIP technology
4. Understand the concepts of multimedia networking.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			✓	✓		✓						
CO2											✓	✓
CO3										✓		
CO4	✓		✓	✓		✓						

ECCSOESC	SOFT COMPUTING TECHNIQUES	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- Artificial Intelligence, Various types of production systems, characteristics of production systems.
- Neural Networks, architecture, functions and various algorithms involved.
- Fuzzy Logic, Various fuzzy systems and their functions.
- Genetic algorithms, its applications.
- Optimization Techniques applied to various applications

Soft Computing and Artificial Intelligence

Introduction To Soft Computing, Soft Computing Vs. Hard Computing, Various Types of Soft Computing Techniques, Applications of Soft Computing.

Introduction to Artificial Intelligence, Various Types of Production Systems, Characteristics of Production Systems, Breadth First Search, Depth First Search Techniques, Other Search Techniques Like Hill Climbing, Best First Search, A* Algorithm, AO* Algorithms and Various Types of Control Strategies. Knowledge Representation Issues, Prepositional and Predicate Logic, Monotonic and Non Monotonic Reasoning, Forward Reasoning, Backward Reasoning, Weak & Strong Slot & Filler Structures, NLP.

Neural Network

Structure and Function of a Single Neuron: Biological Neuron, Artificial Neuron, Definition of ANN, Taxonomy of Neural Net, Difference B/W ANN and Human Brain, Characteristic and Applications of ANN, Single Layer Network.

Perceptron and Counter Propagation Network

Perceptron Training Algorithm, Linear Separability, Widrow and Hebb's Learning Rule/Delta Rule, ADALINE, MADALINE, AI V/S ANN. Counter Propagation Network- Architecture, Functioning and Characteristics of Counter Propagation Network.

Fuzzy Logic Controller

Functional Diagram - Fuzzification - Membership Value Assignments Using Intuition - Membership Functions - Defuzzification: Max-Membership Principle - Centroid Method - Weighted Average Method - Inference Engine – Knowledge Base - Rule Base - Case Studies.

Genetic Algorithm, Hybrid Soft Computing Techniques and Applications

Optimization – Traditional Optimization Methods – Concept of Evolutionary Algorithm – Genetic Algorithm – Encoding and Decoding of Variables – GA Operators – Reproductions – Cross Over – Mutation – Fitness Function –Fitness Scaling.

Neuro-Fuzzy Hybrid Systems – Genetic Neuro Hybrid Systems – Genetic Fuzzy Hybrid and Fuzzy Genetic Hybrid Systems – Simplified Fuzzy ARTMAP – Applications: A Fusion Approach of Multispectral Images With SAR, Optimization of Traveling Salesman Problem Using Genetic Algorithm Approach, Soft Computing Based Hybrid Fuzzy Controllers.

REFERENCES

1. S.N. Sivanandam and S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 2011.
2. S, Rajasekaran and G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication, 1st Edition, 2009.
3. George J Klir, Bo Yuan, Fuzzy sets & Fuzzy Logic,Theory & Applications, PHI Publication.
4. N.K.Bose, Ping Liang, Neural Network fundamental with Graph, Algorithms & Applications, TMH, First Edition, 1998.
5. Bart Kosko, Neural Network & Fuzzy System, PHI Publication, First Edition, 2009.
6. Rich E, Knight K, Artificial Intelligence, TMH, Third Edition, 2012.
7. Martin T Hagen, Neural Network Design, Nelson Candad, Second Edition, 2008.

COURSE OUTCOMES

At the end of the course the students can able to

1. Learn about soft computing techniques and their applications.
2. Analyze various neural network architecture.
3. Define the fuzzy systems
4. Analyze the genetic algorithms and their applications.
5. Know various Optimization Techniques applied to various applications

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			✓	✓		✓						
CO2											✓	✓
CO3		✓						✓		✓		
CO4	✓		✓	✓		✓						
CO5										✓		

ECCSOESC	**CLOUD COMPUTING**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

COURSE OBJECTIVES

- Gives the idea of evolution of cloud computing
- Provides knowledge about its services available today
- Helps to the design and development of simple cloud service.
- Focused on some key challenges and issues around cloud computing.

Introduction

Cloud-Definition, Benefits, Usage Scenarios, History of Cloud Computing - Cloud Architecture - Types of Clouds - Business Models Around Clouds – Major Players in Cloud Computing - Issues in Clouds - Eucalyptus - Nimbus - Open Nebula, Cloud Sim.

Cloud Services

Types of Cloud Services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as Services. Service Providers - Google, Amazon, Microsoft Azure, IBM, Sales Force.

Collaborating using Cloud Services

Email Communication over the Cloud - CRM Management - Project Management-Event Management - Task Management – Calendar - Schedules - Word Processing – Presentation – Spreadsheet - Databases – Desktop - Social Networks and Groupware.

Virtualization for Cloud

Need For Virtualization – Pros And Cons of Virtualization – Types of Virtualization –System Vm, Process VM, Virtual Machine Monitor – Virtual Machine Properties - Interpretation And Binary Translation, HLL VM - Hypervisors – Xen, KVM , Vmware, Virtual Box, Hyper-V.

Security, Standards and Applications

Security in Clouds: Cloud Security Challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed Management Task Force – Standards for Application Developers – Standards for Messaging – Standards For Security, End User Access to Cloud Computing, Mobile Internet Devices and The Cloud.

REFERENCES

1. John Rittinghouse & James Ransome, Cloud Computing, Implementation, Management and Strategy, CRC Press, 2010.
2. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Que Publishing, August 2008.
3. David E.Y. Sarna Implementing and Developing Cloud Application, CRC press 2011.
4. Lee Badger, Tim Grance, Robert Patt-Corner, Jeff Voas, NIST, Draft cloud computing synopsis and recommendation, May 2011.
5. Anthony T Velte, Toby J Velte, Robert Elsenpeter, Cloud Computing : A Practical Approach, Tata McGraw-Hill 2010.

COURSE OUTCOMES

Upon Completion of the course, the students will be able to

1. Understand clearly about the introduction of cloud computing
2. Acquired knowledge about its services
3. Design and development of simple cloud service.
4. Implement Practical applications using cloud
5. Gain knowledge on some key challenges and issues around cloud computing

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓			✓		✓						
CO2												
CO3	✓		✓					✓				
CO4		✓		✓		✓						
CO5										✓		

ECCSOESC	CRYPTOGRAPHY SYSTEMS	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES

- To explore the use of developments in cryptography systems for effective data transfer.
- To deal with the underlying principles of cryptography and network security.
- To provide an extensive coverage of the techniques and methods needed for the proper functioning of the ciphers.
- To study the concept of the construction and cryptanalysis of block ciphers, stream ciphers and hash functions.
- To describe the IP security architecture and methods to overcome the ill effects of attacks.

Network Security Concepts

Classical security - Techniques and Computer Network Security Concepts - Confidentiality and Security, Security Policy and Operations Life Cycle, Security System Development and Operations - The Attack Process - Attacker Types - Vulnerability Types - Attack Results - Attack Taxonomy.

Encryption

Basic encryption techniques - Concept of cryptanalysis - Shannon's theory - Perfect secrecy - Block ciphers - Cryptographic algorithms - Features of DES - Stream ciphers - Pseudo random sequence generators – linear complexity - Non-linear combination of LFSRs - Boolean functions

Crypto Systems

Private key and Public key crypto systems - One way functions - Discrete log problem - Factorization problem - RSA encryption - Diffie Hellmann key exchange - Message authentication and hash functions –Digital signatures - Secret sharing - features of visual cryptography - other applications of cryptography.

Crypt Analysis

Hash functions and message digests, public key encryption, authentication, digital signatures, zero knowledge interactive protocols, elliptic curve cryptosystems, formal verification, hard problems.

IP Security

Overview, IP security architecture, authentication, header, security payload, security associations, key management, web security requirement, secure sockets layer, transport layer security, secure electronic transaction, dual signature, intruders, viruses, worms, firewall design, trusted systems, antivirus techniques, digital immune systems.

REFERENCES

1. Douglas A. Stinson, “Cryptography, Theory and Practice”, 2nd edition, Chapman & Hall, CRC Press Company, Washington.
2. William Stallings, “Cryptography and Network Security”, 4th edition, Prentice Hall of India, New Delhi, 2005.
3. Koblitz N, “A Course on Number Theory and Cryptography”, Springer Verlag, 1986.
4. Menezes A. et. al, “Handbook of Applied Cryptography”, CRC Press, 1996.

COURSE OUTCOMES

On completion of this course the students will be able to

1. To implement the use of developments in cryptography systems for effective data transfer.
2. To work with the principles of cryptography and network security.

3. To design an extensive coverage of the techniques and methods needed for the proper functioning of the ciphers.
4. To understand the concept of the construction and cryptanalysis of block ciphers, stream ciphers and hash functions.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	✓	✓	✓	✓	✓	✓				✓		
CO2	✓	✓	✓	✓	✓	✓				✓		✓
CO3	✓	✓	✓	✓	✓	✓				✓		
CO4	✓	✓	✓	✓	✓	✓				✓		✓
CO5					✓	✓	✓		✓	✓	✓	✓

AUDIT COURSES

ECCSACSC	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES

Students will be able to:

- Understand that how to improve your writing skills and level of readability
- Learn about what to write in each section
- Understand the skills needed when writing a Title
- Ensure the good quality of paper at very first-time submission

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

REFERENCES

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.

COURSE OUTCOMES

At the end of the course students will be able to

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title
4. Ensure the good quality of paper at very first-time submission

Mapping Course Outcomes(Cos) with Programme Outcomes(Pos)												
Course Outcomes(Cos)	Programme Outcomes(Pos)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										✓		✓
CO2										✓		✓
CO3										✓		✓
CO4										✓		✓

ECCSACSC	DISASTER MANAGEMENT	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES

Students will be able to

- learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Repercussions of Disasters and Hazards

Introduction: Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Manmade disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

Disaster Prone Areas In India

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics

Disaster Preparedness and Management

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

Risk Assessment

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

Disaster Mitigation

Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation.
Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

REFERENCES

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.

2. Sahni, Pardeep Et.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall of India, New Delhi.
3. Goel S. L. , Disaster Administration And Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi.

COURSE OUTCOMES

At the end of the course students will be able to

1. Demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Understand the standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Mapping Course Outcomes(Cos) with Programme Outcomes(Pos)												
Course Outcomes(Cos)	**Programme Outcomes(Pos)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						✓	✓	✓				✓
CO2						✓	✓	✓				✓
CO3						✓	✓	✓	✓			✓
CO4						✓	✓	✓	✓			✓

ECCSACSC	**SANSKRIT FOR TECHNICAL KNOWLEDGE**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

COURSE OBJECTIVES

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

Order, Introduction of roots, Technical information about Sanskrit Literature

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

REFERENCES

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

COURSE OUTCOMES

Students will be able to

1. Understanding basic Sanskrit language

2. Ancient Sanskrit literature about science & technology can be understood
3. Being a logical language will help to develop logic in students.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1								✓				✓
CO2								✓				✓
CO3								✓	✓			✓

ECCSACSC	**VALUE EDUCATION**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

COURSE OBJECTIVES

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature ,Discipline

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Character and Competence – Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence ,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

REFERENCES

1. Chakroborty, S. K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

COURSE OUTCOMES

Students will be able to

1. Knowledge of self-development
2. Learn the importance of Human values
3. Developing the overall personality

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						✓	✓					✓
CO2						✓	✓					✓
CO3						✓	✓	✓	✓	✓		✓

ECCSACSC	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES

Students will be able to

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

History of Making of the Indian Constitution and Philosophy of the Indian Constitution

History, Drafting Committee, (Composition & Working)**,** Philosophy of the Indian Constitution: Preamble, Salient Features

Contours of Constitutional Rights & Duties

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

Organs of Governance

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Local Administration

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayati raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Election Commission

Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

REFERENCES

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

COURSE OUTCOMES

Students will be able to

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						✓	✓					✓
CO2						✓	✓					✓
CO3						✓	✓	✓	✓	✓		✓
CO4												✓

ECCSACSC	**PEDAGOGY STUDIES**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

COURSE OBJECTIVES

Students will be able to:

- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Introduction and Methodology

Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education, Conceptual framework, Research questions**,** Overview of methodology and Searching.

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies, How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?, Theory of change. Strength and nature of the body of evidence for effective pedagogical practices, Pedagogic theory and pedagogical approaches, Teachers' attitudes and beliefs and Pedagogic strategies.

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community., Curriculum and assessment, Barriers to learning: limited resources and large class sizes

Research gaps and future directions

Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

REFERENCES

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2):245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

COURSE OUTCOMES

At the end of the course students will be able to understand:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓	✓					✓
CO2						✓	✓					✓
CO3						✓	✓	✓	✓	✓		✓

ECCSACSC	STRESS MANAGEMENT BY YOGA	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES

- To achieve overall health of body and mind
- To overcome stress

Definitions of Eight parts of yoga. (Ashtanga)

Yam and Niyam.
Do`s and Don'ts in life.
i) Ahinsa, satya, astheya, bramhacharya and aparigraha
ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Asan and Pranayam

i) Various yoga poses and their benefits for mind & body
ii) Regularization of breathing techniques and its effects-Types of pranayam

REFERNCES

1. 'Yogic Asana for Group Training-Part-I" : Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

COURSE OUTCOMES

Students will be able to:

1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						✓	✓					
CO2						✓	✓					

ECCSACSC	**PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS.**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

COURSE OBJECTIVES

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Neetisatakam - Holistic development of personality: Verses- 19,20,21,22 (wisdom), Verses- 29,31,32 (pride & heroism), Verses- 26,28,63,65 (virtue), Verses- 52,53,59 (dont's), Verses- 71,73,75,78 (do's)

Approach to day to day work and duties. Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.

Statements of basic knowledge. Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68, Chapter 12 -Verses 13, 14, 15, 16,17, 18, Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36, 37, 42, Chapter 4-Verses 18, 38, 39, Chapter18 – Verses 37, 38, 63.

REFERENCES

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P. Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

COURSE OUTCOMES

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life

2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students.

Mapping Course Outcomes(COs) with Programme Outcomes(POs)												
Course Outcomes(COs)	**Programme Outcomes(POs)**											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1						✓	✓	✓				✓
CO2						✓	✓	✓				✓
CO3						✓	✓	✓				✓