GONDWANA UNIVERSITY, GADCHIROLI

TWO YEAR POST GRADUATE DEGREE COURSE IN THE FACULTY OF ENGINEERING AND TECHNOLOGY

COURSE AND EXAMINATION SCHEME WITH CREDIT GRADE SYSTEM

ELECTRONICS AND COMMUNICATION ENGINEERING

I - SEMESTER M. TECH (ECE)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory Course						Laboratory Course			
								Max. Marks							
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Internal Assessment MSE	IE	Total	Min. Pasing Marks	Min. Marks TW	Max. Marks POE	Total	Min. Passing Marks
ECE 101	Probability and Stochastic Processes	3	1	0	4	3	70	10	20	100	50	---	---	---	---
ECE 102	Information Theory and Coding	3	1	0	4	3	70	10	20	100	50	---	---	---	---

ECE 103	Data Communication and Networking	3	1	0	4	3	70	10	20	100	50	---	---	---	---
ECE 104	Advanced Digital Signal Processing	3	1	0	4	3	70	10	20	100	50	---	---	---	---
ECE 105	Lab Practice - I	---	---	4	4	3	---	---	---	---	---	50	50	100	50
	Total	12	4	4	20	---	---	---	---	400	---	---	---	100	---
Semester Total					20	500									

GONDWANA UNIVERSITY, GADCHIROLI

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COURSE AND EXAMINATION SCHEME WITH CREDIT GRADE SYSTEM

ELECTRONICS AND COMMUNICATION ENGINEERING

II - SEMESTER M.TECH (ECE)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory Course						Laboratory Course			
								Max. Marks							
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Internal Assessment		Total	Min. Pasing Marks	Min. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
ECE 201	Embedded Systems	3	1	0	4	3	70	10	20	100	50	---	---	---	---

Advanced

ECE 202	Optical Communication ~~and Devices~~	3	1	0	4	3	70	10	20	100	50	---	---	---	---
ECE 203	Cellular and Mobile Communication	3	1	0	4	3	70	10	20	100	50	---	---	---	---
ECE 204	Advanced Audio and Video Communication	3	1	0	4	3	70	10	20	100	50	---	---	---	---
ECE 205	Lab Practice - II	---	---	4	4	3	---	---	---	---	---	50	50	100	50
	Total	12	4	4	20	---	---	---	---	400	---		---	100	---
Semester Total					20										

GONDWANA UNIVERSITY, GADCHIROLI

TWO YEAR POST GRADUATE DEGREE COURSE IN THE FACULTY OF ENGINEERING AND TECHNOLOGY

COURSE AND EXAMINATION SCHEME WITH CREDIT GRADE SYSTEM

ELECTRONICS AND COMMUNICATION ENGINEERING

III - SEMESTER M. TECH (ECE)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week				Theory Course						Laboratory Course			
		L	T	P	No. of Credits	Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Internal Assessment MSE	Max. Marks Internal Assessment IE	Total	Min. Pasing Marks	Min. Marks TW	Max. Marks POE	Total	Min. Passing Marks
ECE 301	Elective - I*	3	1	0	4	3	70	10	20	100	50	---	---	---	---
ECE 302	Elective - II*	3	1	0	4	3	70	10	20	100	50	---	---	---	---

ECE 303	Grand Seminar	0	4		4	---	---	---	100	100	50	---	---	---
ECE 304	Project Phase I Seminar	---	---	8	8	---	---	---	---		---	200	---	200
	Total	6	6	8	20	---	---	---	---	300	---	---	---	200
Semester Total					20	500								

GONDWANA UNIVERSITY, GADCHIROLI

TWO YEAR POST GRADUATE DEGREE COURSE IN THE FACULTY OF ENGINEERING AND TECHNOLOGY

COURSE AND EXAMINATION SCHEME WITH CREDIT GRADE SYSTEM

ELECTRONICS AND COMMUNICATION ENGINEERING

IV- SEMESTER M.TECH (ECE)

Course Code	Course Title	Teaching Scheme				Examination Scheme									
		Hours per week			No. of Credits	Theory Course						Laboratory Course			
								Max. Marks							
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Internal Assessment MSE	IE	Total	Min. Pasing Marks	Min. Marks TW	Max. Marks POE	Total	Min. Passing Marks
ECE 401	Project Phase II Dissertation	---	---	20	---	---	---	---	---	---	---	250	250	500	250
	Total			20	---	---	---	---	---		---	---	---	500	---
Semester Total				20		500									

LIST OF ELECTIVES

Elective I

1. Real Time Signal Processing
2. RF Circuits
3. VLSI Design
4. Wireless Sensor Networks

Elective II

1. Neural Networks & Fuzzy Logic
2. Advance Satellite Communication
3. Network Security & Cryptography
4. Micro Electro Mechanical System (MEMS)

Lab 1 :

Atleast Five Practical each from subject 1) Advance Digital Signal Processing and 2) Data Communication and Networking

Lab 2:

Atleast Five Practical each from subject 1) Embedded Systems and 2) Cellular and Mobile Communication

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TWO YEAR POST GRADUATE DEGREE COURSE IN THE FACULTY OF ENGINEERING AND TECHNOLOGY

ELECTRONICS AND COMMUNICATION ENGINEERING SYLLABUS

I - SEMESTER M.TECH (ECE)

ECE 101 PROBABILITY THEORY & STOCHASTIC PROCESSES

UNIT I

Random variables, Probability distribution function, Probability density function, Conditional probability, Statistical Independence, Bayes formula. Moments of random variables: Expected value and moments, Mean and variance of random variable, Coefficients of variation, Skewness and kurtosis, Moments, Covariance and Correlation coefficient, Mean and variance of sum and Product of two random variables. Conditional mean and variance, Application of conditional mean and variance.

UNIT II

Discrete Random Variables and their Distributions Moment Generation Function, Characteristics Function, Cumulants, Probability generating function, Binomial Distribution, Negative Binomial Distribution, Hypergeometric distribution, Multinomial, Poisson Distributions, Relationship between various Discrete-Type distributions

UNIT III

Continuous Random Variables and their Distributions Normal, Log - Normal, Multivariate Normal, Gamma, Exponential, Chi-square, Weibull, Rayleigh distributions. Relationship between continuous distributions.

UNIT IV

Transformation of Random Variables Transformation of Single, Several Random Variables, Function of Random Variables, Sum, Differences, Product and Ratio of Two Random Variables, Transformation through characteristic Functions.

UNIT V

Stochastic Processes Introduction- Classification of stochastic process, Stationary process (SSS

and WSS) Stationary process, Ergodic Process, Independent increment Process, Markov Process, Counting Process, Narrow- Band Process, Normal Process, Wiener-Levy Process, Poisson, Bernoulli, Shot noise Process, Autocorrelation Function.

Reference Books:

1. Michel K. Ochi , "Applied Probability and Stochastic Processes," John Wiley & Sons .
2. Papoulis, A. "Probability, Random variables and Stochastic Processes," Tata McGraw Hill.
3. Kishor S. Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science
   Application," John Wiley & Sons, 2002.

ECE 102 INFORMATION AND CODING THEORY

UNIT I : Information Theory

Concept of Information and Entropy, Shanon's theorems, Channel Capacity Self information, Discrete and Continuous entropy, Mutual and joint information, Redundancy.

UNIT II: Coding Theory, Source encoding, channel encoding, Coding of discrete memoryless sources, Discrete memory sources, Shanon-Fano, Huffman, Lempel-Ziv encoding algorithm, Coding of analog sources, Rate Distortion functions, Channel encoding, Error Detection & Correction.

UNIT III: Various types of Channel coding, Linear block codes, Systematic linear codes & optimum coding for Binary symmetric channel, The Generator & parity check matrices, Syndrome decoding & Symmetric channels, Hamming codes, Weight enumerator, Perfect codes, BCH codes, Idempotent & Mattson Solomon polynomials, Reed Solomon codes, Justeen codes, MDS codes & generalized BCH codes.

UNIT IV: Convolution and Turbo Codes

Linear convolution encoders, Structural properties of Convolution codes, Viterbi decoding technique for convolution codes - Soft / Hard decision, concatenation of block codes and convolutional codes, performance analysis, concept of Trellis coded modulation. Turbo Codes -

Parallel concatenation, Turbo encoder, Iterative decoding using BCJR algorithm, Performance analysis.

UNIT V: Performance of codes

Performance of linear block codes, convolution codes, and other codes, code incurable error probability, Upper & lower bounds.

Reference Books:

1. Wilson, Digital Modulation and coding, Pearson Education
2. B.P. Lathi, Communication System, Oxford Publications
3. Ranjan Bose, Information Theory, Coding & Cryptography, TMH Publication
4. Error Control Coding, Shu Lin, Daniel J Costello Jr., II Edition, Pearson Education
5. Digital Communication, J.G.Proakis, Fourth edition, Mc GrawHill

ECE 103 DATA COMMUNICATIONS AND NETWORKING

UNIT I:

Data Communications and Networks Overview: Data Communications Model Communication Tasks, Basic concepts of Networking and Switching, Networking configurations, Protocols and Architecture, Key Elements of a Protocol, Protocols in Simplified Architecture, Protocol Data Units (PDU), Operation of a Protocol Architecture, Standardized Protocol Architectures, OSI and TCP/IP Architectures, Comparisons between OSI and TCP/IP, TCP/IP Addressing Concepts, concepts of Frequency, Spectrum and Bandwidth, Modem, Codec and Shannon Capacity.

UNIT II:

Line Configuration, Interfacing, Characteristics of Physical Layer Interface, Flow Control, Sliding Window Flow Control, Error control, CRC, ARQ Protocols, Data Link Control, Bit stuffing, HDLC Operation; Hierarchy of FDM schemes, WDM Operation, TDM Link Control, Hierarchy of TDM, DS-1 Transmission Format, SONET/SDH Frame Formats. Asymmetrical Digital Subscriber Line, xDSL.

UNIT III:

Circuit Switching and Packet Switching, Circuit Switching concepts, Circuit Switching applications, Circuit Switch Elements, Three Stage Space Division Switch, Blocking and Non-blocking switching, Time Division Switching, Control Signaling Functions, In Channel signaling, Common Channel Signaling, Introduction to Signaling System Number 7 (SS7), Packet Switching Principles, Datagram and Virtual Circuit switching.

UNIT – IV

LAN Architecture. Topologies, Choice of Topology, Ring and Star Usage, MAC and LLC, Generic MAC Frame Format, Bridge, Bridge Operation, Bridges and LANs with Alternative Routes, Spanning Tree, Loop resolution in bridges, Hubs, Two Level Star Topology, Layer 2 Switches, Wireless LAN, Multi cell Wireless LANs, IEEE 802.11 Architecture, IEEE 802.11, Medium Access Control logic.

UNIT – V

ATM, Architecture of ATM, Congestion Control and Quality of Service in ATM, Internetworking, IPv4, IPv6 comparison , Transport layer protocols, UDP Operation, TCP features, Flow Control, Error Control, Congestion Control, Network Management System, SNMP, SIP, and H.323 architectures, Security in the Internet, IP Security, Firewalls.

Reference Books:

1. William Stallings, “Data and Computer Communications”, Eigth Edition, Pearson Prentice Hall, 2007.

2. Behrouz A. Forouzan, “Data Communications and Networking”, Fourth Edition, Tata Mc Graw Hill, 2007

ECE 104 ADVANCED DIGITAL SIGNAL PROCESING

UNIT I: Z-transform, Region of convergence, Stability and ROC, Inverse z-transform, Discrete Fourier transform, Time domain aliasing, Properties of DFT, Fast Fourier transform, Decimation in time algorithm, IDFT using FFT algorithm, Design of IIR low pass and High pass Digital filters

UNIT II: Analog filter design, Discrete time IIR filter from analog filter, IIR filter by impulse invariance, Bilinear transformation, approximation of derivatives, (HPF, BPF, BRF), filter design

using frequency translation, structures of FIR, Linear phase, FIR filter, filter design using windowing techniques and frequency sampling techniques. Implementation of filter using filter structure.

UNIT III: Adaptive systems, Definition and characteristics, General properties, open and closed loop adaptation, Performance function and performance surface, Gradient and minimum MSE, Methods of searching the performance surface, Simple gradient search algorithm, Gradient search by method of steepest descent, The LMS adaptive algorithm.

UNIT IV: Digital Signal Processors

Multiplier and Multiplier Accumulator, Modified bus structure and Memory access scheme in P-DSPs, Multiple access memory, Multiported memory, VLIW architecture, Instruction pipelining, Architecture and Assembly language instructions of TMS320C5X processor.

UNIT V: Implementation of Digital Filters:

Introduction to filter structures (IIR & FIR), Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

Parametric Methods of Power Spectrum Estimation: Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters - Finite word-length effects in FFT algorithms.

Reference Books:

1. Alan V Oppenheim, Ronald W Schafer "Digital Signal Processing" PHI, 2000
2. Sanjit K Mitra "Digital Signal Processing" Tata Mc Graw-Hill Third Edition
3. Theory and applications of DSP Rabiner and B.Gold.
4. Digital signal processing: Princoples, Algorithms, Applications, John G Proakis and D G Manolakis.
5. Digital signal processing, E.C.Ifeachor, B.W.Jrevitions, Pearson education.

II - SEMESTER M.TECH (ECE)

ECE 201 EMBEDDED SYSTEMS

UNIT-I

Introduction to Embedded Systems: Review of Microprocessors and their features. Differences between Microprocessors and Microcontrollers, Application areas of Embedded Systems, Categories of Embedded Systems. Overview of Embedded System Architecture, Challenges & Trends of Embedded Systems, Hardware Architecture, Software Architecture.

UNIT-II

CISC vs RISC, AVR family architectureRegister file,ALU, Memory types,Memory access and Instruction execution,stack operations,I/O memory, EEPROM, I/O ports, SRAM,timer,UART, Interrupt structure,Internal watchdog timer, power-down modes

UNIT-III

ARM Processor families,AMBA Bus Protocol, Registers,Current Program Status Register, Pipeline, Exceptions,Interrupts, Vector table,ARM5vE Instruction set: Data Processing Instructions, Branch Instructions Load-Store Instructions Software Interrupt Instruction, Program Status Register Instructions, Loading Constrants,ARMv5E Extensions, conditional Execution,THUMB

UNIT-IV

INSTRUCTION SET: Thumb Register Usage, ARM-Thumb Interworking, Branch Instructions, Data Processing Instructions,single, multiple register load- store instructions stack instructions, software interrupt instruction

UNIT-V

Introduction to Real time systems: Issues in real time computing, Structure of real time system,Need for RTOS, Task classes,Performance measures for real time system: Properties,raditional performance measures, performability, cost functions and hard deadlines,Estimating program run times

Reference Books:

1. David.E.Simon , “An Embedded Software Primer” Pearson Education.

2. Mazidi M.A ," The AVR microcontroller &embedded system using Assembly & C."
3. Dhananjay Gadre,"Programming & customizing the AVR microcontroller."
4. Raj Kamal,Embedded Systems - Architecture, Programming and Design ,2nd dition, TM
5. Jane W. S. Liu,"Real Time Systems ."

ECE 202 ADVANCED OPTICAL COMMUNICATION

Unit - I: Introduction to guided optical communication. Optical Fibers, types of fibers & optical Cables, Study of losses during transmission through viz. Attenuation by Absorption & Scattering, Consideration of losses in designing of High Speed / High bandwidth optical communication systems, Selection of fiber for such systems.

Unit - II: Optical Sources: Types of LEDs used in optical communication, their construction & operating principle, Types of Lasers. Principle of working of Lasers, solid state & injection Lasers.

Unit - III: Optical Detectors: Introduction & study of type of detectors characteristics. Spectral spread and availability of detectors for 980 nm, 1.3 µm & 1.55 µm _ systems. Calculation of detector sensitivity and design considerations of suitable receivers for LAN, WAN applications.

Unit IV: Optical fiber measurements and power budget:
Fiber attenuation measurements, Fiber dispersion measurements, Fiber refractive index profile measurements, fiber cutoff wavelength measurements, numerical aperture measurements, Fiber diameter measurements.
Optical amplifiers, EDFA, Soliton Systems & design of system required in LAN & WAN type of applications. Calculations of Power budgets and feasibility of system design for above optical sources.

Unit V: Multiplexing Components & Techniques : Concepts of WDM, DWDM system design parameters, Optical multiplex / Demultiplex design considerations- Angular dispersive devices,

Dielectric thin film filter type devices.

Reference Books:

1. Optical Communication Systems by John Gowar (PHI)

2. Optical Fiber Communication by Gerd Keiser (MGH) .

3. Optical Fiber Communication Principles & Practice by John M. Senior

(PHI pub. 1996.)

4) Reema Thareja : Data Warehousing, Oxford Unviersity Press.

5) Paulraj Ponniah : Data Warehousing Fundamentals, John Wiley.

6) Vikram Pudi and P. Radha Krishna, Oxford University Press.

7) M.H.Dunham : Data Mining Introductory and Advanced Topics,

Pearson Education, 2.

8) Han, Kamber : Data Mining Concepts and Techniques, Morgan

Kaufmann, Pieter Adriaans, Dolf Zantinge.

ECE 203 CELLULAR AND MOBILE COMMUNICATION

UNIT I

Overview of wireless communication systems: 1G, 2G, 2.5G, 3G and 4G technologies, WLL, WLAN, WLAN and PAN Standards IEEE802.11a/b/g/superG, WiFi, WiMAX, IEEE 802.22, and Bluetooth, Zigbee.

UNIT II

Cellular Concept: Frequency reuse, Channel assignment strategies, handoff strategies,

Interference and system capacity, near end and far end interference, effect of near end mobile units. Grade of service, improving coverage and capacity in cellular systems.

UNIT III

Mobile radio propagation: large scale propagation, free space propagation model. Outdoor propagation models: longely Rice model, Durkin's model, Okumura model, Hata model, PCS Extension to Hata model. Indoor propagation models: partition losses(same floor), partition losses(between floors), log distance path loss model, ericsson multiple breakpoint model, attenuation factor model, signal penetration into buildings.

UNIT IV

Small scale fading & multipaths: Factors influencing small scale fading, small scale multipath measurements, parameters of mobile multipath channel. Types of small scale fading. Spread Spectrum techniques,Multiple Access techniques: FDMA, TDMA, CDMA, MC-CDMA, OFDMA

UNIT V

Modulation techniques for mobile radio, constant enevelope modulation AMPS, and ETACS, GSM.Intelligent network for wireless communication advanced intelligent network (AIN), SS7 network for ISDN & AIN. Wireless ATM networks.

Reference Books:

1. Rappaport, "Wireless Communication", Pearson Education, 2nd edition, 2002.
2. William C. Y. Lee, "Mobile Cellular Telecommunications: Analog and Digital +Systems", 2nd edition, McGraw-Hill Electronic Engineering Series, 1995.
3. William C.Y. Lee, "Mobile Communication Engineering", Mc-Graw Hill, 1997.
4. Mike Gallegher, Randy Snyder, "Mobile Telecommunications Networking with IS-41", McGraw Hill 1997.
5. Kernilo, Feher, "Wireless Digital Communications", PHI, 2002.

ECE 204 ADVANCED AUDIO AND VIDEO COMMUNICATION

UNIT I

Voice and Audio Encoding Systems, General Block Diagram of a Voice and Audio Encoding System; Human Auditory System: Application to Voice and Audio Encoding. Analysis of Audio and of Music.

UNIT II

Predictive Encoding, Discrete Cosine Transform, Sub-Band Analysis, Bit Localization Strategies, Rate / Distortion Techniques, Encoding in The Time Domain, PCM Encoding, Predictive Encoding,

UNIT III

Encoding in the Frequency Domain; MPEG-1 Audio, MPEG-2, Audio and MPEG-2 AAC,

MPEG-4 Audio, Dolby AC-3 Audio; Applications: Voice over IP.

UNIT IV

Basic steps of Video Processing, Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT V

2-D Motion Estimation Optical flow, General Methodologies, Pixel Based Motion Esimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

Reference Books:

1. Vijay Madisetti, "Video, Speech, and Audio Signal Processing and Associated Standards", CRC Press, 2009.
2. Apte, " Speech and Audio Processing",Wiely India.

III – SEMESTER M.TECH (ECE)

ELECTIVE I

ECE 301 A REAL TIME SIGNAL PROCESSING

UNIT I

Real time concepts, Structural levels of processing, Digital Signal processing and DSP systems, Comparison between general purpose and DSP processors. Examples of digital signal processors, Motivation of the specialized processors. Fixed point vs Floating point, native data word width.

UNIT II

Key features of TMS 320CS54XX, architecture, addressing modes and Instruction set of TMS 320C54XX, special instructions – FIRS and LMS.

UNIT III

Architecture, addressing modes and instruction set of Analog devices Blackfin Processor ADSP 215XX

UNIT IV

Implementation of Digital Filters on DSP Processors - FFT, FIR filters, IIR filters, Adaptive filters and multirate filters.

UNIT V

Practical DSP applications in communications, Sine wave generators and applications, Noise generators and applications, DTMF tone detection, Adaptive echo cancellation, Speech enhancement techniques.

Reference Books:

1. John G. Ackenhhusin, Real time Signal Processing, Prentice Hall of India, 1999.

2. Sen M. Kuo and Bob H. Lee, Real time Digital Signal Processing – Implementations, applications and experiments with TMS 55XX, John Wiley Publications, 2001.

3. TMS 320C54XX,User's guide.

4. Avatar Singh and S. Srinivasan, Digital Signal Processing Implementations using DSP processors, Thomson Brooks, 2004.

5. Data Sheets of Blackfin Processor.

ECE 301 B RF CIRCUITS

UNIT I

MIC Technology - Thick film and Thin film technology. Hybrid MIC's. Monolithic MIC technology.

UNIT II

Analysis of stripline and microstripline. Method of conformal Transformation. Characteristic parameters of strip. Microstrip lines. Microstrip Circuit Design. Impedance transformers. Filters, Lumped constant Microstrip circuits.

UNIT III

Coupled Microstrips and Directional couplers. Even and odd mode analysis. Theory of couled microstrip Directional couplers. Calculations for a coupled pair of Microstrips. Branch line couplers.

UNIT IV

Lumped Elements for MIC's Design and fabrication of lumped elements, circuits using lumped elements.

UNIT V

Nonreciprocal components for MIC's Microstrip on Ferrimagnetic substrates, Microstrip circulators. Isolators and phase shifters. Design of microstrip circuits - high power and low power circuits.

Reference Books:

1. Gupta KC, and Amarjit Singh, Microwave Integrated circuits, Wiley Eastern,1974.

2. Leo Young, Advances in Microwaves, Academic Press.

3. Bharathi Bhat,and S.K. Koul"stripline-like transmission lines for microwave integrated circuits, New age international ,2007.

ECE 301 D WIRELESS SENSOR NETWORKS

UNIT

Overview of wireless sensor networks, Challenges for Wireless Sensor Networks design, Enabling Technologies for Wireless Sensor Networks.

UNIT II

Architecture of WS,Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III

Networking sensors, Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT IV

Infrastructure establishments, topology control , clustering, time Synchronization, localization and Positioning, Sensor Tracking and Control.

UNIT V

Sensor networks platforms and tools, Sensor node hardware - Berkeley Motes, programming challenges,node-level software platforms, Node-level Simulators, State-centric programming.

Reference Books:

1. Holger Karl & Andreas Willig, ″ Protocols And Architectures for Wireless Sensor Networks″ , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach″, Elsevier, 2007.
3. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks- Technology Protocols, And Applications”, John Wiley, 2007.
4. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

ELECTIVE II

ECE 302 A NEURAL NETWORKS AND FUZZY LOGIC

UNIT-I:

Introduction to ANS (Artificial Neural systems) Technology, ANS simulation, Types of Neural Networks: Hopfield, perceptron and related models, Adaline and Madaline: Adaline and the Adaptive Linear Combiner, the Madaline and simulating the Adaline. Essential vector operations, Lateral Inhibition and Sensory Processing.

UNIT-II:

Probabilistic Models, Fuzzy ARTMAP and Recurrent Networks:-Probabilistic Neural Networks, General Regression Neural Networks, Fuzzy ARTMAP, Recurrent Back propagation Neural Networks, Hybrid Learning Neural Networks:- Counter propagation Network, Radial basis Function Networks.

UNIT-III

Application of Neural Networks:- Design and optimization of Systems: Non-Linear optimization, Inverse design problems, Pattern Recognition Applications: Control Chart pattern Recognition, Recognition of Machine-Cells in a group technology layout. Complex pattern Recognition tasks: Pattern mapping, Temporal patters, pattern variability, Neocognitron, Addition of lateral inhibition and Feedback to the Neocognitron.

UNIT - IV

Introduction to Fuzzy systems, Fuzzy sets and operations on Fuzzy sets, Basics of Fuzzy relations, Fuzzy measures, Fuzzy integrals, Transform Image coding with Adaptive Fuzzy systems, Adaptive FAM systems for Transform coding.

UNIT-V

Comparison of Fuzzy and Kalman-Filter Target, Tracking control systems, Fuzzy and Math-Model Controllers, Real Time Target Tracking, Fuzzy Controller, Kalmaln-Filter Controller, Fuzzified CMAC and RBF - Network based self learning Controllers.

Reference Books:

1. James A. Freeman and David M. Skapura,Neural Networks; Algorithms
Applications and Programming Techniques, Pearson Education, India,2008.
2. James A. Anderson ,An introduction to Neural Networks ,PHI,2003.
3. B.Yegnanarayana,Artificial Neural Networks, PHI Publications India,2006.
4. M.Ananda Rao and J.Srinivas, Neural Networks: Algorithms and Applications, Narosa Publications 2009.

ECE 302 B ADVANCED SATELLITE COMMUNICATIONS

Introduction: Satellite communication, Brief History. Orbits of satellite: Low, medium and Geo synchronous orbit characteristics, Angle period, returning period, Angle of elevation, propagation delay, orbital spacing.

UNIT II

Satellite Links: Delay transponders, Earth Stations, Antennas and Earth coverage, Altitude and eclipses, link design.

UNIT III

Earth space propagation effects: Frequency window, Free space loss, Atmospheric absorption, rainfall attenuation, ionospheric scintillation, Telemetry, Tracking and command of satellites.

UNIT IV

QPSK, Offset QPSK and MSK. Coherent and non-coherent detection, Error rate performance.

UNIT V

Synchronization: Principle and techniques, Multiple Access Techniques, FDMA, SPADE system,TDMA system, concept and configuration, system timing frames format, SSMA-Basu Principles, random access, space communication, , description of operational in TELSAT and INVSAT system.

Reference Books:

1. J. Martin: Communication Satellite System, PH Englewood.
2. D.C.Aggarwal: Satellite Communication, Khanna Publishers.
3. Tri Ha Digital Satellite Communication Tata McGraw Hill.
4. Harry and Yam Trees: Satellite Communication, IEEE Proceedings, 1979.

ECE 302 C NETWORK SECURITY AND CRYPTOGRAPHY

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for

Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

UNIT II

Encryption Algorithms: Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST- 128, RC2, Characteristics of Advanced Symmetric block cifers. Conventional Encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT III

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptograpy. Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT IV

Message Authentication and Hash Functions: Authentication requirements and functions,

Message Authentication, Hash functions, Security of Hash functions and MACs.

Hash and Mac Algorithms: MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-

160, HMAC. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards. Authentication Applications: Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT V

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management. Web Security: Web Security requirements, Secure sockets

layer and Transport layer security, Secure Electronic Transaction. Intruders, Viruses and

Worms: Intruders, Viruses and Related threats. Fire Walls: Fire wall Design Principles, Trusted systems.

Reference Books:

1.Cryptography and Network Security: Principles and Practice – William Stallings, Pearson Education.

2. Network Security Essentials (Applications and Standards) by William Stallings
Pearson Education.

3. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)

4. Network Security – Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.

4.Principles of Information Security, Whitman, Thomson.

5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH

6. Introduction to Cryptography, Buchmann, Springer.

ECE 302 D MICRO-ELECTRO MECHANICAL SYSTEM

UNIT I

Introduction, Basic Structures of MEM Devices - (Canti Levers, Fixed Beams diaphragms). Broad Response of MEMS to Mechanical (force, pressure etc.) Thermal, Electrical, Optical and Magnetic stimuli, Compatability of MEMS with VLSI Applications in Electronics, Broad Advantages and Disadvantages of MEMS from the point of Power Dissipation, Leakage etc.

UNIT II

Review of Mechanical Concepts like Stress, Strain, Bending Moment, Deflection Curve. Differential equations describing the Deflection under Concentrated Force, Distributed Force, Deflection Curves for Canti Levers - Fixed beam. Electrostatic Excitation - Columbic Force between the Fixed and Moving Electrodes. Deflection with voltage in C.L, Deflection Vs Voltage Curve, Critical Deflection, Description of the above w.r.t. Fixed Beams.Fringe Fields - Field Calculations using Laplace Equation. Discussion on the Approximate Solutions - Transient Response of the MEMS.

UNIT III

Two Terminal MEMS - capacitance Vs Voltage Curve - Variable Capacitor. Applications of Variable Capacitors. Two Terminal MEM Structures. Three Terminal MEM structures - Controlled Variable Capacitors - MEM as a Switch and Possible Applications

UNIT IV

MEM Circuits & Structures for Simple GATES - AND, OR, NAND, NOR, Exclusive OR, simple MEM Configurations for Flip-Flops Triggering, Applications to Counters, Converters. Applications for Analog Circuits like Frequency Converters, Wave Shaping. RF Switches for Modulation. MEM Transducers for Pressure, Force Temperature. Optical MEMS.

UNIT V

MEM Technologies: Silicon Based MEMS - Process Flow - Brief Account of Various Processes and Layers like Fixed Layer, Moving Layers, Spacers etc., Etching Technologies. Metal Based MEMS: Thin and Thick Film Technologies for MEMS. PROCESS flow and Description of the Processes. Status of MEMS in the Current Electronics scenario.

Reference Books:

1. Gabriel.M. Reviez, R.F. MEMS Theory, Design and Technology, Thon Wiley & Sons, 2003.

2. Thimo Shenko, Strength of Materials, CBS Publishers & Distributors.

3. K. Pitt, M.R. Haskard, Thick Film Technology and Applications, 1997.

4. Wise K.D. (Guest Editor),"Special Issue of Proceedings of IEEE", Vol.86, No.8, Aug 1998.

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