

GONDWANA UNIVERSITY, GADCHIROLI

TWO YEAR POST GRADUATE DEGREE COURSE IN THE FACULTY OF ENGINEERING

AND TECHNOLOGY

ELECTRONICS AND COMMUNICATION ENGINEERING SYLLABUS

III - SEMESTER M.TECH (EC)

ELECTIVE I

PECS31 AWIRELESS SENSOR NETWORKS

UNIT I

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. KazemSohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks- Technology Protocols, And Applications", John Wiley, 2007.
4. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

PECS31 B

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. Ackenhusin, 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.

PECS31 C 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 coupled 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.

ELECTIVE II

PECS32 A

ADVANCED SATELLITE COMMUNICATIONS

UNIT I

Introduction: Satellite communication, Brief History. Orbital mechanics, Look angles, Orbital perturbations, Orbits of satellite: Low, medium and Geo stationary and Geosynchronous orbit characteristics, orbital spacing.

UNIT II

Satellite Link design: Basic transmission theory, System noise temperature C/N ratio, G/T ratio, calculation of noise temperature, Link budget, Design of uplink, Design of down link.

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

Satellite navigation system: Radio and Satellite navigation, GPS Position location principles, GPS time, GPS receivers and their operation, The C/A code, Satellite signal acquisition, GPS navigation message, Differential GPS.

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.

PECS32 B

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, Compatibility 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. Revez, R.F. MEMS Theory, Design and Technology, Thon Wiley & Sons, 2003.
2. ThimoShenko, 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.

UNIT I

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internet network 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 ciphers. 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 Keyexchange, Elliptic Curve Cryptography. 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: MD5, 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 socketslayer

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.