Syllabus & Scheme for

M.Tech. (ECE)

Department of Electronics Engineering

YMCA University of Science & Technology, Faridabad

(Haryana)

M.Tech. (Electronics and Communication Engineering) Syllabus

Total Credit requirement of the course: 71		Max Marks: 2250	
Core Courses	: 10	labs	: 06
Elective Courses	: 02	Seminar	: 01
Project/Dissertation	: 02		

First Semester

Subject Code	Subject	Credit(L-T-P)	Marks Theory (Ext.)	Weightage Sessional (Int.)
E501C	Advanced Microprocessor &Micro Controllers	4 (4-0-0)	60	40
E503C	Satellite &Space communication	4 (4-0-0)	60	40
E505C	Data Communication & Networking	4 (4-0-0)	60	40
E507C	Information & Communication Theory	4 (4-0-0)	60	40
E509C	Satellite Communication Lab	1 (0-0-2)	20	30
E511C	Advanced Microprocessor &Micro Controllers lab	1 (0-0-2)	20	30
E513C	Data Communication & Networking Lab	1 (0-0-2)	20	30
	Total:	19 (16-0-6)	300	250

Second Semester

Subject Code	Subject	Credit(L-T-P)	Marks Theory (Ext.)	Weightage Sessional (Int.)
E502C	Advanced Digital Signal Processing	4 (4-0-0)	60	40
E504C	Optical Communication	4 (4-0-0)	60	40
E506C	Wireless Communication	4 (4-0-0)	60	40
	Elective 1 *	4 (4-0-0)	60	40
E518C	Optical Communication Lab	1 (0-0-2)	20	30
E520C	Advanced Digital Signal Processing lab	1 (0-0-2)	20	30
E522C	Seminar	1 (0-0-2)	-	50
	Total:	19 (16-0-6)	280	270

Third Semester

Subject Code	Subject	Credit(L-T-P)	Marks Theory (Ext.)	Weightage Sessional (Int.)
E601C	Electronic System Design	4 (4-0-0)	60	40
E603C	Digital Communication	4 (4-0-0)	60	40
E605C	Security in Communication Network	4 (4-0-0)	60	40
	Elective II *	4 (4-0-0)	60	40
E617C	MATLAB	1 (0-0-2)	20	30
E619C	Minor Project	4 (0-0-8)	80	120
	Total:	21 (16-0-10)	340	310

Fourth Semester

Subject code	Subject	Credit (L-T-P)	Marks Theory (Ext.)	Weightage Sessional (Int.)
E702C	Dissertation	12 (0-0-24)	200	300
	Total:	12 (0-0-24)	200	300

*The students will have to select subject from list of electives as given below :

ELECTIVE I

CODE	SUBJECT
E508C	VLSI
E510C	Nano Technology
E512C	Data Structure & Programming Language
E514C	Multimedia System
E516C	Statistical Method

ELECTIVE II

CODE	SUBJECT
E607C	Image Processing
E609C	Neural Networks And Fuzzy Logic
E611C	Embedded System
E613C	Advanced Mathematics for Engineers
E615C	Semiconductor Device Modeling

ADVANCED MICROPROCESSOR &MICRO CONTROLLERS

EC-501C **L T P**
4 - -

Unit 1

Design of basic microprocessor architectural Concepts :Microprocessor architecture, word Lengths, addressable memory, Microprocessor's speed architectural characteristics, registers, instruction, memory addressing architecture ,ALU, GPR's Control logic & internal data bus.

Unit 2

Microprocessor Instructions &Communication: Instruction Set ,Mnemonics, Basic Instruction Types , Addressing modes ,Microprocessor I/O connecting I/O put to Microprocessor ,Polling and Interrupts, Interrupt and OM. Controllers.

Unit 3

Microcontroller: Introduction 8051 architecture and programming model. Internal RAM and registers, I/O ports, Interrupt system &Instruction sets.

Unit 4

Advanced Micro processors: lntel X86 family of advanced Microprocessor, programming model for 86 family. X86 addressing modes, instruction set, hardware of 186, 286, 386, 486 & Pentium processors. Motorola 68 XXX family of microprocessor, 68 XXX addressing modes, instruction set, hardware.

Unit 5

Microprocessor 110: Data Communication, parallel I/O serial communication, Serial interface and UART, modems, I/O devices, D/A,A/D interface, special I/O devices.

Unit 6

Developing Microprocessor Based Products: Introduction to the Design Process, Preparing the specifications, Developing a design, Implementing and Testing and design, Regulatory Compliance Testing, design tool for Microprocessor Development.

Text Books:

1. C.M. Gilmore, "Microprocessors Principals and Application", MGH
2. Rajkamal, "Embedded System, Architecture &Programming",TMH

Reference Books:

1. Berry B. Berry, " Inter Series of microprocessors", PHI
2. D. V. Hall, "Microprocessor &Interfacing", TMH
3. Peatman, "Microprocessor Based System Design", Pearson

SATELLITE AND SPACE COMMUNICATION

EC-503C **L T P**
4 - -

Unit 1
Introduction: Satellite communication, Brief History.

Unit 2
Orbits of satellite: Low, medium and Geo synchronous mam characteristics, Angle period, Returningperiod, Angle of Evaluation, Propagation Delay, Orbital Spacing.

Unit 3
Satellite Links: Delay transponders, Earth Stations, Antennas and Earth coverage, Altitude andeclipses.

Unit 4
Earth space propagation effects: Frequency window, Free space loss, Atmospheric absorption,Rainfall Attenuation, Ionospheric scintillation, Telemetry, Tracking and command of satellites.

Unit 5
Detection: QPSK offset QPSK and MSK. Coherent and non-coherent detection, Error rateperformance.

Unit 6
Synchronization: Principle and techniques, Multiple Access Techniques, FDMA, SPADE system,TDMA system, concept and configuration, system timing frames format, SSMA-Basu Principles,YSAT, Random access, space communication, link design description of operational in TELSAT and INSAT system.

Text Books:
1. J. Martin: Communication Satellite System, PH Englewood.
2. D.C.Aggarwal: Satellite Communication, Khanna Publishers.

Reference Books:
1. Tri Ha Digital Satellite Communication Tata McGraw Hill.
2. Harry and Yam Trees: Satellite Communication, IEEE Proceedings, 1979.

DATA COMMUNICATION NETWORKING

EC-505C **L T P**
4 - -

Unit 1
Introduction to Data Transmission: Overview of Data Communication and networking, Analog and Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding.

Unit 2
Digital Data Communication Techniques: Asynchronous And Synchronous Transmission, Error Detection and correction techniques, Physical interfaces

Unit 3
Data Link Control: Link Configurations, Protocol principles (Error control, Flow control), Bit Oriented and character oriented protocol, Data link layer services, Link Control.

Unit 4
Multiplexing: F.D.M. Synchronous TDM, Statistical TDM

Unit 5
Communication Networking Techniques: Communication Networks, Circuit Switching, Message Switching, Packet Switching, Local Networking Technology, The bus / tree topology, the ring topology, Medium Access control protocols *(CSMAlCD,* Token ring, FDDI, DQDB).

Unit 6
Computer Communication Architecture: OSI and TCP/IP Model, Protocol And Architecture, Networking Access protocols, Inter Networking, Transport layer Protocols,
Session Service And Protocols, and Presentation! Application protocols

Unit 7
ISDN Networks: Concepts &Architecture, Protocols

Text Books:
1. William Stallings, "Data and Computer Communication", PHI, 4th Ed.
2. Forouzan, "Data communications and networking",TMH

Reference Books:
1. Andrew Tanenbaum, "Computer Networking", PHI
2. Godbole, "Data communications and network", TMH

INFORMATION &COMMUNICATION THEORY

EC-507C **L T P**
4 - -

Unit 1

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

Unit 2

Coding Theory: Source encoding &channel encoding, Error detection & Correction, Various codes for channel coding, Rate Distortion functions.

Unit 3

Codes used in Information Theory: 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, Convolution codes & Viterbi decoding algorithm.

Unit 4

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

Text books:

1. Blahut R.E., Theory and practice of error control codes, A WL1983.
2. Wilson, Digital Modulation and coding, Pearson

Reference Books:

1. B.P. Lathi, Communication System, Oxford
2. Ranjan Bose, Information Theory, Coding & Cryptography, TMH
3. Dass. , S.K. Malik & P.K. Chatterjee, Principles of digitals communication

SATELLITE COMMUNICATION LAB

E509C **L T P**
_ _ 2

The practical will be based on Satellite communication course.

ADVANCED MICROPROCESSOR &MICRO CONTROLLER LAB

E511C **L T P**
_ _ 2

The practical will be based on Satellite communication course.

DATA COMMUNICATION NETWORKING LAB

E513C **L T P**
_ _ 2

The practical will be based on Satellite communication course.

ADVANCED DIGITAL SIGNAL PROCESSING

EC-502C **L T P**
4 - -

Unit 1

Introduction of DSP: Introduction to Signal Processing, Discrete Linear Systems, superposition Principle, Unit-Sample response, stability &causality Criterion.

Unit 2

Fourier Transform &inverse Fourier transform: Frequency domain design of digital filters, Fourier transform, use of Fourier transform in Signal processing. The inverse fourier transform, Sampling continuous function to generate a sequence, Reconstruction of continuous –time signals from Discrete-time sequences.

Unit 3

DFT &FFT &Z transform with Applications: Discrete Fourier transform, properties of DFT, Circular Convolution, Fast Fourier Transform, Realizations of OFT. The Z transform, the system function of a digital filter, Digital Filter implementation from the system function, the inverse Z- transform, properties &applications, Special computation of finite sequences, sequence of infinite length &continuous time signals, computation of fourier series &time sequences from spectra.

Unit 4

Digital Filter Structure &Implementation: Linearity, time- invariance &causality, the discrete convolution, the transfer function, stability tests, steady state response, Amplitude &Phase characteristics, stabilization procedure, Ideal LP Filter, Physical reliability &specifications.FIR Filters, Truncation windowing &Delays, design example, IIR Filters: Review of design of analog filters &analog frequency transformation. Digital frequency transformation. Design of LP filters using impulse invariance method, Bilinear transformation, Phase equalizer, digital all pass filters.

Unit 5

Implementation of Filters: Realization block diagrams, Cascade &parallel realization, effect of infinite-word length, transfer function of degree 1&2, Sensitivity comparisons, effects of finite precision arithmetic on Digital filters.

TextBooks

1. Alam V. Oppenheim &Ronald W. Schafer, "Digital Signal Processing" PHI.
2. JG Proakis, "Digital Signal Processing", (PHI) 3rd Edition.

Reference Books

1. Rabiner&Gold, "Theory &application of digital Signal Processing", PHI 1992. 2. Roman kuc, "Introduction to Digital Signal Processing," McGraw hill Edition.
2. Roman Kuc, "'Introduction to Digital Signal Processing", McGraw hill Edition

OPTICAL COMMUNICATION

EC-504C **L T P**

4 - -

Unit 1

Introduction: General Communication system, Elements of fiber communication link, Advantages and disadvantages of optical fiber communication ,Application of optical fiber communications, limitation of optical fiber communications

Unit 2

Optical fiber cross section and index profile, propagation of light wave in optical fiber, Ray theory and electromagnetic mode theory for optical propagation, step index and graded index fibers, critical angle, Acceptance angle, Numerical Aperture.

Unit 3

Attenuation, Material Absorption, scattering losses (Rayleigh Scattering),Fiber bend losses, Core and Cladding losses, Dispersion in optical fiber, Intermodal dispersion, Intermodal dispersion , pulse spread by material dispersion ,dispersion shifted and dispersion flattered fiber.

Unit 4

Optical Sources: Principal of light emitting diode (LED), LED Power and Efficiency, Characteristic of LED , LASER , Basic concept: Absorption and Emission of Radiation, population inversion , spontaneous emission , Efficiency of LASER ,Laser to fiber Coupling ,Advantages of LASER over LED.

Unit 5

Optical Detector: Principal for optical detection ,Characteristics of Photo Detectors , P.N Photo Diodes , P.I.N Photo Diodes, Response time of photodiode , Avalanche photodiode , Silicon Reach through Avalanche photodiode, Multiplication factor , Noise in APD.

Unit 6

Introduction of optical communication system , Drive circuits for LED operation , Drive circuits for LASER operation, Optical receiver , Preamplifier , Automatic gain control ,Link power Budget ,Rise time budget, Homodyne and heterodyne detection ,Phase diversity receiver ,Optical TDM ,WDM.

Text books :

1. John Gowar, "Optical Communication Systems", PHI.
2.Gerd Keiser, "Optical Fiber Communication", TMH

Reference Books:

1. Franz JH & Jain VK, "Optical Communication", Narosa Pub Ins
2. John M. Senior, "Optical Communication", PHI

WIRELESS MOBILE COMMUNICATION

EC-506C **L T P**

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Unit 1

Introduction to mobile radio systems: Paging systems, cordless telephone system, Cellular telephonesystems- Cellular concept, frequency reuse, channel assignment strategies, Interference and systemcapacity, trunking and grade of service, cell splitting, sectoring, microcell zone concept, HO Strategies.

Unit 2

Mobile radio propagation: mechanism, free space path loss, log-distance path loss models, Okumaramodel, Hata model, PCS model, Wideband PCS microcell model, indoor propagation models, Jake'schannel model, Multi path characteristics of radio waves, signal fading, Time dispersion, Dopplerspread, coherence time LCR, fading statistics, diversity techniques.

Unit 3

Introduction to spread spectrum communication, multiple access techniques used in mobile wirelesscommunication: FDMAffDMA/CDMA, Cellular CDMA, packet radio protocols, CSMA,reservation protocols, capacity of cellular CDMA, soft HO.

Unit 4

Wireless systems and standards: GSM standards, signaling and call control, mobility management,location tracing, wireless data networking, packet error modeling on fading channels, Performanceanalysis of link and transport layer protocols over wireless channels, mobile data networking(mobile IP), wireless data services, IS-95, GPRS.

Text Books:

1. T. S. Rappaport, "wireless Communications: Principles and practices", PHI 1996.
2.William C. Y. Lee, " Mobile Cellular Telecommunications, Analog and Digital Systems", 2nd ed, MGH-1995.

Reference Books:

1. Kaveh Pahlavan & Allen H. Levesque, "Wireless Information Networks", Wiley series inTelecommunications and signal processing.
2. Kamilo Feher: Wireless Digital communications, Modulation and Spread SpectrumApplications PHI 2001.

VLSI (E508C)

UNIT I REVIEW OF MOS TECHNOLOGY
Evolution of VLSI technology, VLSI Design Flow, Basic MOS Transistor: Enhancement and depletion mode, MOS structure, NMOS, PMOS and CMOS fabrication.

UNIT II ELECTRICAL PROPERTIES OF MOS
Threshold voltage, MOSFET current voltage characteristics, second order effects, MOS inverters: VTC characteristics of NMOS inverter, CMOS inverter and Bi-CMOS inverter. Noise margins, Latch-up in CMOS circuits.

UNIT III DESIGN PROCESS
Physical design of simple and complex logic gates using NMOS and CMOS technology, Stick diagrams, NMOS Design Style. CMOS Design Style, Lambda based Design Rules. Layout.

UNIT IV MOS TRANSISTOR SWITCHING CHARACTERISTICS
Sheet resistance, area capacitance, inverter delay. Switching power dissipation of CMOS inverters.

UNIT V DYANAMIC LOGIC CIRCUITS
CMOS Logic Structure: Complementary CMOS Logic, Pseudo NMOS Logic, Dynamic CMOS Logic, CMOS Domino Logic, Clocked CMOS Logic, Pass Transistor Logic, CMOS transmission gate Logic

UNIT VI SCALING OF MOS CIRCUITS
Scaling models, scaling factor for device parameters, Advantages and Limitations of scaling.

UNIT VII SUBSYSTEM DESIGN
Architectural issues in VLSI, Design of CMOS parity generator, Multiplexer, n-Bit Comparator, Incrementer/Decrementer, ALU subsystem.

TEXT BOOKS:
1. Kang and Leblebici “CMOS Digital integrated circuits” TMH 2003.
2. Pucknell D.A and Eshrachain K. “Basic VLSI Design Systems & circuits”(PHI)
3. Introduction to Digital Circuits: Rabaey (PH)

NANO TECHNOLOGY

E510C **L T P**
4 - -

Unit 1

Atomic structure: Basic crystallography, Crystals and their imperfection, Diffusion, Nucleation and crystallization, metals, Semiconductor & Insulators, Phase transformation, Ceramic materials.

Unit 2

Physical properties of materials: Electrical &Thermal properties, Optical properties of material, magnetic properties of materials,Density of state,Coulomb blockade, Kondo effect, Hall effect,Quantum hall Effect.

Unit 3

Nanostructure:Introduction to Nanotechnology, Zero dimensional Nanostructure – Nano particles, One Dimensional Nanostructue – Nano wires & Nano rods, Two Dimensional Nano structure-Films, Special Nano materials, Nano structures fabricated by physical techniques, Properties of Nano materials,application of Nano structure, Basics of Nano Electronics.

Unit 3

Characterization of Nano materials: SPM Techniques – Scanning Tunneling Microscopy,Atomic force Microscopy, Magnetic force Microscopy, Electron Microscopy – Scanning Electron Microscope, Transmission Electron Microscope.

Reference Books:

1. Introduction to solid state physics : C .Kittel
2. Introduction to theory of Solids : H.M. Roenberg
3. Physics & Chemistry of materials : Joel I. Gersten
4. Handbook of Nanotechnology : Bharat Bhushan

DATA STRUCTURE & PROGRAMMING LANGUAGE

E512C **L T P**
4 - -

Unit 1
Re C/C++ : fundamentals, expressions, selection statements, loops, functions, recursive functions, pointers, introduction to OOPS ; encapsulation, excess modifiers, polymorphism, inheritance overriding methods, abstract classes.

Unit 2
Fundamental Notation: Primitive and Composite data type, time and space complexity.

Unit 3
Data Structure: Stacks, queues, arrays, linked list, trees and graphs.

Unit 4
File Structure: Indexing structure like B-trees, ISAM, hashing technique for direct method files, inverted list, Multilist.

Unit 5
Sorting: Internal and external sorts, searching techniques, merging algorithm.

MULTIMEDIA SYSTEMS

E514C **L T P**

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Unit 1

Introduction: Concept of Multimedia, Emerging Applications, Multimedia Systems and Appliances.Distributed Multimedia Systems, Synchronization, Orchestration and QOS Architecture standards.

Unit 2

Digital audio representation and processing: Audio in computer applications, its digitalrepresentation, transmission and digital processing, speech recognition and generation.

Unit 3

Digital video and image compression: Video compression techniques and standardization of algorithms, JPEG, MPEG, DVI technology.

Unit 4

Multimedia Information Systems: Workstation OS, New OS support, Real Time Mach, Multimediasystem service architecture, Media Stream Protocol, service and window system, client control ofcontinuous media, Hyper applications. Multimedia Information systems, File system support, DataModels.

Unit 5

Multimedia communication systems: Public Network services and N/W Protocols, Quick timeMovie File (QMF), format, OMFI, MHEG, Format function Real time Interchange, Track Modeland Object Model Teleconferencing systems, Shared Amlication Architectures, EmbeddedDistributed objects, Multimedia conferencing architecture, architecture of team workstation.

Unit 6

Multimedia and Internet: The internet, client server technology, Communication Protocols, Internet Addressing, WWW, HTML, and Web Authorizing, Web page browsers and development,bandwidth .and applications considerations, Design Considerations for Web pages, AccessingContent on internet

TextBooks:

1 John F. KoegelBufod, "Multimedia Systems", Addison Wesley, Edition. 2000

2.David Hillman, "Multimedia Technology and Application", Galgotia Publication - Edition 1998.

Reference Books:

1. Fred Halsall, "Multimedia Communications", Pearson

2. Rao, Bojkovic&Milovanovic, "Multimedia Comm. System: Techniology , Std. & Network", PHI

STATISTICAL METHODS

E516C **L T P**

4 - -

Unit1

Random variables and distribution function. Probability mass and probability density function, Two dimensional random variables: joint, Marginal and conditional distributions, Independence of random variables. Moments, Expectation, Variance covariance, conditional expectation.

Unit 2

Probability generating and Moment generating functions, Characteristic function.Inversion and uniqueness theorems of characteristic function.

Unit 3

Probability distributions; Binominal, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Beta, Gamma, Weibull and Normal

Unit 4

General/Stochastic Process, definition, classification and examples, compound distribution, Random walk Gambler's ruin problem.

Unit 5

Markov chains, higher transition probabilities. Classification of states and chain, determination of higher transition probabilities, Stability of Markov systems, limiting behavior.

Unit 6

Poisson process and related distribution, Generalization of Poisson process.Birth process. Generalized Birth death processes, Linear Birth death processes.

Unit 7

Queueing systems, general concepts, Queueing models *IMIM/l, MIMII/R, MIMIC,* MIM/<XJ, MIM/C/C, MlE_kmodels. Machine interference problem.

TEXTBooks:

1. Bailey, N.T.J: Elements of Stochastic Process
2. K.S Trivedi : Probability and Statistics, PHI, 3rd edition

Reference Books:

I. Medhi, J , New International publication
2. Bhatt B.R, Stochastic models
3. Kashyap, B.R.K and Chaudhary, M.L.: An introduction to Queuing Theory

OPTICAL COMMUNICATION LAB

E518C

L T P

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The practical will be based on Satellite communication course.

ADVANCED DIGITAL SIGNAL PROCESSING LAB

E520C

L T P

_ _ 2

The practical will be based on Satellite communication course.

ELECTRONICS SYSTEM DESIGN

EC601C **L T P**
4 - -

Unit 1
Review of Digital Electronics concept

Unit 2
MSI and LSI Circuits And Their Applications: Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR And AND-OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.

Unit 3
Sequential Machines: The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set *I* Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock *FIF,* Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters, Shift Registers and Memory.

Unit 4
Multi Input System Controller Design: System Controllers, Design Phases And System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position And Detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, State Assignment, Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations, Programmable System Controllers, ROM, PLA And PAL Based Design. Introduction to the CPLD &FPGA.

Unit 5
Asynchronous Finite State Machines: Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, Plotting And Reading The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method.

Text Books:
1. Fletcher, "An Engineering Approach to Digital Design" PHI 1990
2. Z. Kohavi, "Switching and Finite Automata Theory", TMH

Reference Books
1. Markovitz, "Introduction to Logic Design", TMH
2. Mano, "Digital Design", PHI

DIGITAL COMMUNICATION

E603C

L T P

4 - -

Unit 1

Analog to Digital Conversion: Sampling Theorem, Pulse Amplitude Modulation, Channel bandwidth for PAM signal, Natural sampling, Flat top sampling, quantization of signals, Quantization error, Pulse Code Modulation (PCM), The PCM system, Companding, Multiplexing PCM signals, Differential PCM, Delta Modulation, Adaptive Delta Modulation.

Unit 2

Digital Baseband Transmission : A baseband digital communication system, Digital Data formats, Line coding and its properties,Various PAM formats or line codes, Unipolar RZ and NRZ, Polar RZ and NRZ, Bipolar NRZ, Split Phase Manchaster format, Polar Quanternary NRZ format, The Optimum filter, Matched Filter, Calculation of Probablity of error for matched filter, Intersymbol Interference(ISI), Cause of intersymbol interference, Nyquist's criterion for distortion less baseband binary transmission.

Unit 3

Signal Space Analysis : Concept of Additive White Gaussian Noise(AWGN) Channel, Concept of Optimum Receiver, Geometric representation of signals, Gram –Schmidt Orthogonalisation procedure.

Unit 4

Digital Modulation Techniques : Coherent binary modulation techniques, Coherent binary amplitude shift keying, Binary Phase Shift Keying(BPSK), Coherent Binary Frequency Shift Keying (BFSK), Noncoherent binary modulation, Differential Phase Shift Keying (DPSK), Quadrature Phase Shift Keying (QPSK), Minimum shift Keying (MSK), Calculation of probability of error of BPSK, BFSK, QPSK, Relationship between bit error rate, symbol error rate, Comparison of modulation techniques.

Text Books:

1. Taub and Schilling, "Principal of Communication System",TMH
2. S.Haykin, "Digital communication",Willey Pub.

Reference Books:

1. WayenTomasi, "Electronic Communication System" ,Pearson pub.
2. J.Dass, S.K.Mullick& P.K. Chatterjee, "Principal of Digital Communication" , Willey Eastern Pub

SECURITY IN COMMUNICATION NETWORKS

E 605 C

L T P

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Unit -1

Introduction: Security trends, The OSI security architecture, Security attacks, Security services, Security mechanisms, Models of Internetwork security.

Unit -2

Symmetric Encription and Message Confidentiality: Symmetric encryption principles,Algorithms,Stream ciphers and RC4, Clipher block modes of operation, Location of encryption devices, Key distribution.

Unit -3

Public Key Cryptography and message Authentication: Different approaches to message authentication, HMAC, public key cryptography principles and algorithm, Digital signature, Key management.

Unit -4

Network Security Application: Electronic Mail Security, IP security overview, Architecture, Authentication Header, Encapsulating Security payload, Combining Security Association, Key management.

Unit -5

Web Security Requirement, Secure Socket layer and transport layer security, Secure Electronic Transaction, Network management Security.

Reference Books

1. Network Security Essentials: Application and standard, William Stalling(Third edition)
2. Computer network and data communication by Frozen

IMAGE PROCESSING

E607C **L T P**

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Unit 1

Introduction: Elements of Storage, Processing Communication Display.

Unit 2

Digital Image Fundamentals: Visual Perception, simple image models, concept of uniform and nonuniform sampling &quantization, Relationships between pixels-neighbors of pixel, connectivity labeling of connected components. Relations, equivalence and Transitive closure, Distance measures, Arithmetic/ Logic operation, Imaging Geometry Basic and perspective transformation stereo imaging.

Unit 3

Image Transforms: Discrete Fourier transform, 2-D Fourier Transforms and its properties. Fast Fourier transform and its uses. Walsh, Hadamard Discrete cosine, Heir and slant transforms hostelling their algorithms and computer implementations.

Unit 4

Image Enhancement: Spatial and frequency domain methods point processing, intensity transformation, Histogram processing image substation and Averaging spatial filtering, LP, HP and homo-morphic felling, generation of spatial marks, Color image processing.

Unit 5

Image Restoration: Degradation model, digitalization of circulate and block circulate metrics, Algebraic approved invoice filtering, wiener filter, constrained least square restoration, Interactive restoration in spatial domain geometric transformation.

Unit 6

Image Compression: Redundancy models, error free compression, Lossy compression, Image compression standards.

Unit 7

Image Segmentation: Detection of Discontinuity, Edge detection, Boundary detection, Thresholding, Regional oriented segmentation use of motion in segmentation.

Unit 8

Representation and Description: Image analysis, Pattern and their classes, Decision theoretical methods, Structural methods, Interpretation.

TextBooks:

I. Anil K Jain, "Fundamentals of Digital Image Processing", PHI Edition 1997.

II. Keenneth R Castleman, " Digital Image Processing", Pearson

Reference Books:

III. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Pearson 2.Chanda&Majumder, "Digital Image Processing &Analysis", PHI

NEURAL NETWORKS &FUZZY LOGICS

E609C

L T P

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Unit 1

Introduction: Neural networks characteristics, History of development In neural networks principles, Artificial neural net terminology, Model of a neuron, Topology.

Unit 2

Learning Methods &Neural network models: types of learning, Supervised, Unsupervised, Reinforcement learning. Knowledge, representation and acquisition. Basic Hop field model, Basic learning laws, Unsupervised learning, Competitive learning, Kmeans clustering algorithm, Kohonen's feature maps.

Unit 3

Artificial Neural Networks: Radial basis function neural networks, Basic learning laws in REF nets, Recurrent back propagation. Introduction to counter propagation networks, CMAC network, and ART networks.

Unit 4

Applications of neural nets: Applications such as pattern recognition, Pattern mapping, Associative memories, speech and decision-making.

Unit 5

Fuzzy Logic: Basic concepts of fuzzy logic, Fuzzy vs. Crisp set, linguistic variables, Membership functions Fuzzy sets & Operations of fuzzy sets Fuzzy IF-THEN rules, Variable inference techniques,De-Fuzzification, Basic fuzzy inference algorithm ,Fuzzy system design, Antilock Breaking system(ABS),Industrial applications.

Text Books:

1. J.M. Zurada, "Introduction to artificial neural systems", Jaico Pub.
2. ROSS J.T , "Fuzzy logic with engineering application", TMH

Reference Books:

1. Simon Haykin, "Neural Networks", PHI
2. Ahmad M.Ibrahim, "Introduction to applied Fuzzy Electronics", (PHI)
3. P.D. wasserman, "Neural computing theory &practice", (ANZA PUB).

EMBEDDED SYSTEMS

E611C **L T P**

4 - -

Unit 1

Introduction to embedded system : Background and History of Embedded System, Defination and Classification, Programming language for embedded system: desirable characterstic of programming language for embedded system, low-level versus high-level language, main language implementation issue : control, typing. Major programming languages for embedded systems.Embedded System on a Chip (SOC) and the use of VLSI designed circuits.

Unit 2

Processor and Memory Organization : Structural units in processor, Processor selection for an embedded system, Memory devices, Memory selection, Allocation for memory to program segments and blocks and memory map of a system, DMA, Interfacing Processor. I/O Devices-Device I/O types and examples V Synchronous – Iso-synchronous and Asynchronous Communication from serial devices – Examples of internal serial-communication devices –UART and HDLC –Parallel Port Devices – Sophisticated interfacing features in Device/ports –Timer and Counting Device.

Unit 3

Microcontroller : Introduction to microcontrollers, Evolution, Microprocessors vs Microcontrollers, MCS-51 Family Overview, Important Feature, Architecture. 8051 Pin functions,Architecture, Addressing Modes, Instruction set, Instruction Types.

Unit 4

Programming : Assembly Programming . Timer Registers, Timer modes, Overflow flags, clocking sources, timer counter interrupts, baud rate generation. Serial port register, mode of operation, initialization,accessing, multiprocessor communications, serial port baud rate.

Unit 5

Interrupts:InterruptOrganisation, Processing interrupts, Serial port interrupts, External interrupts, interrupt service routines. Microcontroller specification, Microcontoller design, testing, timing subroutines, look up tables, serial data transmission.

Unit 6

Application : Interfacing Keyboards, Interfacing Displays, Interfacing A/D and D/A converters, Pulse Measurement, Loud Speaker Interface, Memory Interface.

Unit 7

Laboratory work : Implementation using Embedded operating systems like RT Linux, WindowsCE,Windows XP Embedded, Assembly language for 8051 on Pinnacle.

Text Books:

1.JohnB.Peatman, “Design with PIC Microcontroller”,Pearson Pub

2. Predko, “programming and customizing the 8051 microcontroller “ , TMH.

Reference Books:

1. Mazidi, “The 8051 microcontroller and embedded system” ,Pearson Pub.
2. Deshukh, “Microcontroller” ,TMH.

ADVANCED MATHEMATICS FOR ENGINEERS

E613C
L T P
4 - -

Unit 1

Fourier Transforms: Introduction, Fourier Integral Theorem, Fourier Sine and Cosine Integral, Complex form of Fourier Integrals, Fourier Transforms, Inverse Fourier Transform, Properties, Modulation Theorem, Convolution Theorem for Fourier Transforms, Parseval's Identity, Fourier Transforms of derivative of functions, Relation between Fourier and Laplace transform.

Unit 2

Z -Transform: Introduction, Properties of Z- Transform, Evaluation of inverse Z Transform.

Unit 3

Matrices and Linear System of Equations: Solution of linear simultaneous equations by Gaussian elimination and its modification, Crout'striangularization method, Iterative methods- Jacobins method, Gauss-Seidal method, Determination of Eigen values by iteration.

Unit 4

Conformal Mapping: Conformal mappmg, liriear transformations, Bi-linear transformations, Schwarz's-Christoffel transformations.

Unit 5

Calculus Of Variations: Euler-Lagrange's differential equation, The Brachistochrone problems and other applications. Isoperi-metric problem, Hamilton's Principle and Lagrange's Equation.Rayleigh-Ritz method, Galerkin method.

TextBook:

1. Dr. B.S. Grewal; "Higher Engineering Mathematics", Khanna Publishers
2. Churchill, "Fourier Series and Boundary Values Problems", McGraw Hill.
3. Galfand&Fomin, "Calculus of Variations", Prentice Hall.

Reference Books:

1. Churchill, "Complex Variables &Applications", McGraw Hill.
2. Elsgole, "Calculus of Variations", Addison Wesley.
3. LN. Sneddon.The Use ofIntegral Transforms", Tata McGraw Hill.

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SEMICONDUCTOR DEVICE MODELLING

E615C
L T P
4 - -

Unit 1
Review of Semiconductor Physics : Basic semiconductor equations: Poisson's equations, Current continuity and boundary conditions.

Unit 2
The Physical Parameter: Doping profiles, carrier mobility, generation – recombination rates, bandgap narrowing effect, other physical parameters.

Unit 3
Numerical Solution Methods: Scaling of variables and parameters, finite difference scheme, Discretization of Poisson's and current continuity equations, truncation error, discretization of time dependent problems, designing a mesh. The Newton – Raphson method of solving non-linear algebric equations.Direct method of matix inversion, iterative and other methods, rate of convergence, error estimation.

Unit 4
Examples of actual device Modeling : numerical treatment of boundary conditions, general procedures of device modeling, short channel effects in MOSFET's, breakdown voltage in Si-P-Paineu diodes, permeable base transistor (PBT)

Unit 5
Monte Carlo Simulation : the Boltzmann transport equation, electron motion in the momentum space, Determination of free-flight time, selection of scattering processes, scattering rates, selection of momentum states after collisions, mean velocity and mean energy, Monte Carlo Simulation of BJT's,
Non isothermal and Hot-Carrier problems heat transfer equation, discretization of energy balance equations, application to hot-carrier phenomenon .

Unit 6
Modeling of Hetero devices :bandgap engineering, bandgap offset at abrupt heterojunctions, modified current continuity equations, material parameters, heterojunction bipolar transistor (HBT's)

Unit 7
The Schrodinger – Poissionsolver : Modeling of inversion layer charges in MOS devices.