SYLLABI

M.Tech

IN

ELECTRONICS AND COMMUNICATION

ENGINEERING

2016

Department of Electronics and Communication Engineering

JAYPEE UNIVERSITY OF ENGINEERING & TECHNOLOGY

A-B ROAD, RAGHOGARH, DT. GUNA-473226 MP, INDIA

2 Year M. Tech. Curricula for Electronics & Communication Engineering

M. Tech. (ECE), 1st Year - I Semester

SN	Sub Code	Subject	Core /Elective	L	T	P	Credits
1	14M11EC111	Advanced Communication System	Core	3	0	0	3
2	14M11EC114	VLSI Circuits & System Design	Core	3	0	0	3
3	14M11EC112	Advanced Satellite & Fiber Communication System	Core	3	0	0	3
4	14M11EC113	Advanced Telecommunication Networks	Core	3	0	0	3
5	14M17EC171	ECE Design and Simulation Lab-I	Core	0	0	4	2
6		**DE -I**	Elective	3	0	0	3
		Total		15	0	4	**17**

M. Tech. (ECE), 1st Year - II Semester

S. No.	Sub Code	Subject	Core /Elective	L	T	P	Credits
1	14M11EC211	Advanced Digital Signal Processing	Core	3	0	0	3
2	14M11EC212	Advanced Wireless and mobile communication	Core	3	0	0	3
3	14M11EC213	Information and Coding Theory	Core	3	0	0	3
4	14M11CI214	Multimedia Systems	Core	3	0	0	3
5	14M17EC271	ECE Design and Simulation Lab -II	Core	0	0	4	2
6		**DE-II**	Elective	3	0	0	3
		Total		**15**	**0**	**4**	**17**

M. Tech. (ECE), 2nd Year - III Semester

S. No.	Sub Code	Subject	Core/ Elective	L	T	P	Credits
1		**DE-III**	Elective	3	0	0	3
2		**DE-IV**	Elective	3	0	0	3
3	14M19EC391	Seminar-I	Core	0	0	4	2
4	14M19EC392	Dissertation Part-I *	Core	0	0	24	12
		* To be continued in Semester IV					
		Total		**6**	**0**	**28**	**20**

M. Tech. (ECE), 2nd Year - IV Semester

S. No.	Sub Code	Subject	Core/Elective	L	T	P	Credits
1		**DE-V**	Elective	3	0	0	3
2		**DE-VI**	Elective	3	0	0	3
3	14M19EC491	Seminar-II	Core	0	0	4	2
4	14M19EC492	Dissertation Part-II **	Core	0	0	24	14
		Total		**6**	**0**		**22**

Notes-

1. Dissertation ** to be continued from III semester.

2. Final evaluation of dissertation will be based on the cumulative performance in all III and IV.

3. It is desirable to have one publication from the dissertation.

List of Electives

List of Departmental Electives for I Semester (DE-1)		
To be updated from time to time		
S. No.	**Sub Code**	**Subject**
1	14M14EC131	Detection and Estimation
2	14M14EC132	Microwave theory and Circuits
3	14M14EC133	Speech Processing

	List of Departmental Electives for II Semester (DE-II)	
	To be updated from time to time	
S. No.	**Sub Code**	**Subject**
1	14M14EC231	Antenna Theory & Design
2	14M14EC232	CMOS Digital Design Technique
3	14M14EC233	Adaptive Signal Processing
4	14M14EC234	Optical Networks

List of Departmental Electives for III semester (DE-III & DE-IV)		
To be updated from time to time		
S. No.	**Sub Code**	**Subject**
1	14M14EC331	Digital Image Processing
2	14M14EC332	Advanced Error Control Coding
3	14M14EC333	Analogue VLSI Design
4	14M14EC334	Biomedical Signal Processing
5	14M14EC335	Digital Signal Processors and Applications
6	14M14EC336	Performance Evaluation of Communication Systems
7	14M14EC337	Spread Spectrum Theory
8	14M14EC338	Synthesis of Digital Systems
9	14M14EC339	Wireless Networks

List of Departmental Electives for IV semester (DE-V & DE-VI)		
To be updated from time to time		
S. No.	**Sub Code**	**Subject**
1	14M14EC432	EM Theory for Microwave and Fiber Optics
2	14M14MA431	Wavelets and Applications

SYLLABI
Master of Technology (M.Tech.)
Branch – ECE

Year/Sem: Ist Year/Ist Sem

14M11EC111 Advanced Communication System

Introduction: Elements of a communication system, Different types of signals, PSD, Random process, Ergodicity, Noise, Source Coding: Formatting data, Quantization, Dithering, Source coding, Baseband modulation & Correlative coding: Pulse modulation, Correlative coding, Analog Communication systems (A.M.): Different types of AM & FM systems, Transmitters, Receivers and Antenna systems, Phase Locked Loop: Theory and applications, Capture range, Lock range, order of Low pass filter, Loop dynamics, Communication Link Analysis: Link Budget Analysis, Sources of signal loss & noise, Path loss, Link margin, System trade-off, Base band modulation & demodulation/detection: Base band modulation, Demodulation, Detection of binary signal in Gaussian noise, Band pass modulation & demodulation: Coherent detection, non coherent detection, error performance for M- ray systems, Multicarrier Modulation: Multicarrier modulation with overlapping sub channels, OFDM, Challenges in Multicarrier system, Spread Spectrum Communication: DSSS, Cellular system, FHSS, CDMA, Wireless sensor networks, Cognitive Radio, Wavelets and their applications

14M11EC112 Advanced Satellite and Fiber Communication System

Elements of Satellite Communication: Satellite frequency bands, communication satellite systems, Kepler's laws, Satellite orbits, LEO, MEO, GEO, HEO, LOOK angles & visibility, Orbital effect in communication system performance, Satellite Link Design: Basic transmission theory, EIRP, Antennas Gain patterns, Common antenna type, parabolic disc, atmospheric losses, system noise temperature & G/T ratio, UP link & down link analysis, frequency reused, Satellite Transponder: Transponder model, Satellite front end, RF filtering of digital carriers, introduction to satellite single processing, transponder limiting & non-linear satellite amplifiers, Optical Fiber Communication System: Basic optical laws and definitions, Optical fiber modes and configurations, N.A. Attenuation: Units, absorption, scattering losses radioactive losses, core and cladding losses. Material dispersion, wave guide dispersion, intermodel dispersion,Optical Sources: Light Emitting Diodes: structure, light source materials. Laser Diodes: structure, threshold conditions, and modulations of Laser diodes. Light source linearity, reliability considerations, Optical Detectors: Physical principles of photodiodes, photo detector noise, detectors response time, avalanche multiplication noise, temperature effect on avalanche gain.

14M11EC113 Advanced Telecommunication Networks

Introduction: Overview of Telecommunication Networks. Convergence of Telecommunication and Computer Networks, Network Model Concepts: Switching and Transmission, Types of Information and Signals, Data Rate Considerations, Integration of Data and Voice, Characteristics of Voice Data and Video Signals, Communication Switching: Circuit Switching- Space, Time and Hybrid Switching Techniques, Packet Switching and Comparison with Circuit Switching, Telecommunication and other Networks: Features of Telephone, Computer and Broadcast Networks, Signalling types and purpose, OSI Seven Layer Model: Description and Functions of Different Layers, Communication Protocols and Interfaces. Communication and network standards, IEEE 802.XX Standards: Local area Networks- Topology, Media Parameters, Media Control and Standards, Metropolitan Area Networks, Cell Switching, ATM and Broadband Networks: Broadband Network Requirements and Concept. Cell Switching and ATM (Asynchronous Transfer Module), BISDN (Broadband Integrated Services Digital Network), Internet Telephony: Telephone Communication Using Packet Switching.

14M11EC114 VLSI Circuit and System Design

Building blocks of VLSI: Overview of VLSI, Complexities and Design, VLSI Simulation Steps and Tools, MOS Transistor Theory: A review of MOS structure and operation, MOS I-V characteristics, MOSFET model for Circuit Simulation, Scaling and Small Geometry effects, CMOS Process Flow: Basic steps, CMOS n-well process, Twin-Tub process, layout design rules, MOS Inverter: Static and Dynamic Characteristic, Performance Estimation, Combinational MOS logic circuits: Transmission gate, Dynamic logic, Timing issues in CMOS Digital Circuits, Semiconductor Memories, SRAM, DRAM, ROM analysis and design, HDL based design: Language Fundamentals, Behavioral and RTL style of modelling, Data Flow style of description, Structural style, Test-Bench, Hazards and Fault Analysis, Network Performance: Performance Parameters like Data Rate/Bandwidth, Error Rate, Distance, Blocking, Traffic Definition, Queuing Analysis, Wireless Networks, Network Management. SDH (Synchronous Digital Hierarchy), Security Issues.

14M14EC131 Detection and Estimation Theory

Review of Probability and Stochastic Processes: Stochastic Models & Stochastic Processes? Review of probability: joint and conditional probability, Bayes Theorem, Random variables, distribution & density functions, correlation and covariance of random variables, Review of stochastic Processes, Stationary processes; Gauss-Markov Models, Likelihood and Sufficiency, Concept of Detection: Binary hypothesis testing, decision criteria; Bayes, minimax and Neymann- Pearson tests; Composite hypothesis testing, Detection of Signals: Detection of known signal in white noise and colored noise; Detection of signals with unknown parameters, Detection in discrete time: Models and detector structures; detection in Gaussian noise: Detection of stochastic signals, Performance Evaluation of signal Detection Procedures, Concept of Estimation: Basic estimation of parameters using Pseudo Inverse, weighted least square estimate, MMSE, MAP and ML estimates, Cost functions & minimization of Bayes' risk, Invariance of estimates, Estimation of non random parameters; Properties of Estimators, Linear Mean-Square Estimation, Estimation of signals: Wiener filtering problem – smoothing, filtering & prediction, construction of Wiener filter by pre-whitening, Kalman filter. Wiener – Kolgomorov filtering, Detection and Estimation of Parameters: Nonparametric Detection, Locally Optimal Detection, Robust Detection and Estimation, Detection and Parameter Estimation in Radar Systems: Radar Target Models, Target Detection, Parameter Estimation in Radar Systems.

14M14EC132 Microwave Theory and Circuits

Transmission lines for microwave circuits; waveguides, stripline, microstrip, slot line; microwave circuit design principles; passive circuits; impedance transformers, filters, hybrids, isolators etc., active circuits using semiconductor devices and tubes, detection and measurement of microwave signals. Passive Devices and matching, Measurement of Q factor, Impendence, Power, Noise figure, S-parameters, dielectric constant and permeability, Network analyzers, Spectrum analyzers and TDR.

14M14EC133 Speech Processing

Speech production: Mechanism of speech production, Acoustic phonetics – Digital models for speech signals - Representations of speech waveform: Sampling speech signals, basics of quantization, delta modulation, and Differential PCM – Auditory perception: psycho acoustics. Time domain parameters of Speech signal – Methods for extracting the parameters Energy, Average Magnitude, Zero crossing Rate – Silence Discrimination using ZCR and energy – Short Time Auto Correlation Function – Pitch period estimation using Auto Correlation Function. Short Time Fourier analysis: Fourier transform and linear filtering interpretations, Sampling rates - Spectrographic displays - Pitch and formant extraction - Analysis by Synthesis - Analysis synthesis systems: Phase vocoder, Channel Vocoder - Homomorphic speech analysis: Cepstral analysis of Speech, Formant and Pitch Estimation, Homomorphic vocoders. Basic Principles of linear predictive analysis – Auto correlation method – Covariance method – Solution of LPC equations – Cholesky method – Durbin's Recursive algorithm, Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP. Algorithms: Dynamic time warping, K-means clustering and Vector quantization, Gaussian mixture modeling, hidden Markov modeling - Automatic Speech Recognition: Feature Extraction for ASR, Deterministic sequence recognition, Statistical Sequence recognition, Language models - Speaker identification and verification – Voice response system – Speech synthesis: basics of articulatory, source-filter, and concatenative synthesis – VOIP.

14M17EC171   ECE Design and Simulation Lab-I

Forward and reverse bias characteristic curves of PN Junction diode and to find- out the cut-in and reverse break-down voltage. Base and collector (Input & Output) characteristics of Common-Emitter NPN Transistor (Q1N2222), (For Input Characteristics Take V_{CE}=1, 5, 10, 15, 20 Volts and for Output Characteristics Take V_{BB}=0.5, 0.7, 1, 1.5, 2, 2.5, 3 and 3.5 Volts). Transfer& drain characteristics for the JFET (J2N4393) using a given circuit biasing circuits of BJT and MOSFET, Different type of filters. Simulation of various digital logic circuits (NOT, AND, OR, NAND, NOR, XOR, XNOR) and simulation of various combinational circuits.

Year/Sem: Ist Year/ IInd Sem

14M11EC211   Advanced Digital Signal Processing

Review of Digital Signal Processing: Review of discrete–time sequences and systems, Linear Shift Invariant (LSI) systems. Causality and Stability Criterion, FIR & IIR representations, Z-Transform, Digital structures, Fast Fourier Transform, Discrete Fourier Transform (DFT), Fast Fourier Transform (FFT) algorithms using decimation in time and decimation in frequency techniques, Chirp Z-Transform, Hilbert Transform and applications, Digital Filter design: FIR filters design. IIR filter design from analog filters, digital filter design based on least square method, Multirate Digital Signal Processing: Decimation & Interpolation, Sampling rate conversion, Filter design and implementation for sampling rate conversion, applications of multirate signal processing, Adaptive Filters: Introduction. Application of adaptive filters, Adaptive Direct-form FIR filters Adaptive Lattice-Ladder filters,Spectral Analysis and Power Spectrum Estimation: Spectral Analysis of Sinusoidal Signals, Spectral Analysis of Non stationary signals, Nonparametric and parametric methods of power spectrum estimation, Eigen analysis algorithms for spectral estimation.

14M11EC212Advanced Wireless and Mobile Communication

Introduction: Introduction to the wireless communications and its relevance, Cellular Concept and Engineering: Problems in mobile communication, Need for Cells, Spectrum and its utilization – frequency reuse, Cell design considerations, Cell Topology, Co-channel and adjacent –channel cells interference, Cell splitting and sectoring, Coverage and capacity of cellular system, Hand-off techniques, Propagation of Mobile Radio Signals: Radio wave propagation mechanism, Path loss ,Outdoor and Indoor propagation models, Antenna types, size and height, Multipath propagation model ,Different types of fading and their models, Doppler effect and mobility, Signal Processing in Mobile Communication: Speech coders, Channel coding, Modulation types, Their principles, generation and detection techniques, bandwidth and noise performance, Multiple Access Techniques: FDMA and TDMA techniques and their performance, Number of channels, Spread Spectrum and Code Division Multiple Access Techniques: Spread spectrum principles, Spreading and Dispreading techniques, Correlation Detection ,Bandwidth considerations, Spread spectrum types, Code Division Multiple access, Different types of codes - their properties, and generation schemes, Synchronization issues in CDMA systems –transmitters & receivers, Capacity calculation, Mobile Communication Evolution: Features of different generations of mobile communication systems, Global System for Mobiles (GSM) – features, network architecture, radio subsystem, channel types, frame spectrum, other signal processing subsystems and processing of GSM call, CDMA based mobile systems, IS-95, cdma2000 - forward and reverse channels, 3G Mobile Systems and beyond –IMT2000, UMTS, WCDMA,Wireless Data networks: General Packet Radio Service (GPRS), Wireless LAN –IEEE 802.11x: Physical and Media Access Control layer techniques and specifications ,Wireless Metropolitan area Networks (WMAN), IEEE 802.15, IEEE 802.16 & IEEE 802.20 standards and related systems.

14M11EC213 Information and coding Theory

Introduction and Preview: Basic applications of information theory and its relationship with other fields, Entropy, Relative Entropy and Mutual Information: Entropy, Joint entropy and conditional

entropy, Relative, Mutual Information, Chain Rules, Some Inequalities, Jensen's, Log Sum, Data Processing and Fano's inequality,The Asymptotic Equipartition Property and Data Compression: The Asymptotic Equipartition Property and Data Compression, Entropy Rates of a Stochastic Process: Markov Chains, Entropy Rate of a Random Walk, HMP, Data Compression: Uniquely decodable codes, Kraft Inequality, McMillan Inequality, Huffman Code, The channel coding theorem, converse of coding theorem, Error Control Coding: Coding for reliable digital transmission and storage, Types of codes, Modulation and coding. ML decoding, Performance measures, Algebra Background: Groups, Fields, Binary field arithmetic, Vector Spaces over GF(2), Linear Block Codes, Generator and parity check matrices, Syndrome and error detection, Standard array and syndrome decoding, Hamming codes, Cyclic Codes: Polynomial representation, Systematic encoding, Cyclic encoding, Syndrome decoding, Convolutional codes: Structural properties, Tree, Trellis and state diagrams, Encoding of Convolutional codes, Polynomial and rational encoders, Constraint length and minimal encoders, Systematic encoders, ML decoding of convolutional codes- the Viterbi's Algorithm, Implementation issues, Turbo Codes: Introduction. Distance properties, Performance bounds, Encoding parallel concatenated codes, Iterative decoding of turbo codes, MAP decoding-BJSR algorithm.

14M14EC232 CMOS Digital Design Technique

Basics of MOSFETS and CMOS inverter: MOSFET characteristics, Current voltage characteristics, Modeling, Scaling theory, Small device effects, CMOS Inverter: Basic circuit and DC operation, Switching characteristics, RC modeling, Propagation delay, Rise and fall time, DC design, transient design, Power dissipation, Driving large loads, Combination circuit design using CMOS:Complementary CMOS design, Transmission gate logic Circuits BASIC structure, Electrical analysis, RC modeling, TG based switch logic gates ,TG register, D flip flop, n-FET based storage circuits, pass transistor logic, Dynamic CMOS design, DCVSL logic, Sequential circuits: Basics of latch and flip flop, CMOS register, Dynamic latches and registers. Alternative register styles, concept of pipelining, Timing: Basics of timing, setup hold time, clock skew and jitter problems, how to avoid skew and jitter problems, PLL, Designing arithmetic building blocks: Adder, Multipliers, shifters using CMOS, Memory: Designing SRAM, DRAM, ROM using CMOS.

14M11CI214 Multimedia System

Multimedia Programming- Term Multimedia, Term Media, Characterizing Data Streams. Advanced Object Oriented Programming, Reusability, Synchronization, Expandability, Maintainability. Digital Audio and Video Technology- Audio Technology. Audio Representation on Computers, Speech Output, Speech Input, Speech Transmission. Audio Compression: Differential pulse code modulation, Adaptive differential PCM, Adaptive predictive coding, Linear Predictive Coding, Perceptual Coding, Audio Coders. Text Compression: Static Huffman coding, Dynamic Huffman codes, Arithmetic coding, Lempel-Ziv coding. Image Compression: Graphics Interchange format, Tagged image file format, JPEG Video Compression: MPEG, MPEG4, Audio and Video Synchronization. Multimedia Database Management Systems- Multimedia object storage, File Retrieval structures, Disk Scheduling, Metadata for Multimedia, Multimedia Data Access, Multimedia Information Modeling, Object- Oriented Modeling, Querying Multimedia Databases. Multimedia Communication- Standards for multimedia communications. TCP– based system for multimedia streaming, Peer–to–Peer streaming topologies, Distributed Multimedia applications, live/on-demand broadcasting, server bandwidth, distribution control and privacy protection for Internet media delivery, High-End Interactive Television Terminals. Wireless IP networks, wireless video communication, 3G/4G wireless systems. Multimedia applications over Multihop wireless links, World Wide Web. Multimedia Content Analysis- Analysis of individual images, text recognition and similarity based searches in image databases, Audio Analysis, Video Analysis.

14M17EC271 ECE Design and Simulation Lab-II

Designing and simulation of generic type Multiplexer and De-multiplexer, generic type AND, OR, NAND, NOR, XOR gates. VHDL code for generic type AND (bit level) gate using Structural Modeling. Basic component is 2 i/p AND gate, 8:1Multiplexer using 2:1 Multiplexer, different types

of registers in VHDL, 4-bit binary up/down counter using JK flip-flop, Half Adder and write VHDL code using structural modelling, Different types of modelling.

<u>**Year/Sem: IInd Year/ IIIrd Sem**</u>

14M14EC331 Digital Image Processing

Introduction: Human visual system and perception, Image sensing and acquisition, Visual perception, Noise in images, Image sampling and quantization, Pixel connectivity, Image Enhancement: Gray level transformation, histogram processing, Smoothing and sharpening spatial Filters, Smoothing and sharpening frequency domain filters. Morphological Image Processing: Binary morphology- erosion, dilation, opening and closing operations, applications and multistage morphological edge detection. Basic gray-scale morphology operations. Image analysis: Edge and line detection, Hough transform, segmentation, feature extraction, classification image texture analysis, Color models and color image processing. Image restoration: Linear degradation model, inverse and Wiener filtering. Transforms for image coding: Unitary transforms, 2D-DFT, DCT, KLT and Harr transform. Image coding and compression: Lossy and lossless compression, entropy coding, transform coding, sub band coding, image compression standards.

14M14EC332 Advanced Error Control Coding

Introduction to coding (e.g., channel and source coding, Shannon capacity), Linear block codes, Introduction to abstract algebra, Cyclic codes, BCH and RS codes, Convolutional codes, Trellis codes, Turbo codes, LPDC codes.

14M14EC333 Analog VLSI Design

MOSFET Models for Analog CMOS Design: Introduction, Structure of MOSFET, V/I characteristics, Parasitic Capacitance, Second order effects, Small signal equivalent circuit for MOSFETs, Noise in MOSFETs. CMOS Analog Building Block: Single Stage Amplifier, Current Sources, Source Follower, Differential Stage Amplifier, Operational Trans conductance Amplifier, Operational Amplifier. Switched Capacitor Filters: Analog CMOS Layout Issues, Oscillators.

14M14EC334 Biomedical Signal Processing

Introduction: Genesis and significance of bioelectric potentials, ECG, EOG, EMG and their monitoring and measurement, Spectral analysis, digital and analog filtering, correlation and estimation techniques, AR / ARMA models, Adaptive Filters, ECG: Pre-processing, Measurements of amplitude and time intervals, Classification, QRS detection, ST segment analysis, Baseline wander removal, wave form recognition, morphological studies and rhythm analysis, automated diagnosis based on decision theory ECT compression, Evoked potential estimation. EEG: evoked responses, Epilepsy detection, Spike detection, Hjorth parameters, averaging techniques, removal of Artifacts by averaging and adaptive algorithms, pattern recognition of alpha, beta, theta and delta waves in EEG waves, sleep stages, EMG: wave pattern studies, biofeedback, Zero crossings, Integrated EMG. Time frequency methods and Wavelets in Biomedical Signal Processing.

14M14EC335 Digital Signal Processors and Applications

Evolution of Digital Signal Processors, Comparative Performance with General Purpose Processor Processor classes: General Purpose - high performance, embedded processors and processor cores, Microcontrollers etc. Signal Modeling: Difference Equation, Convolution, Transfer Function, and Frequency Response. Signal Processing: Data Manipulation Algorithms Filtering Estimation, Correlation. Implementation of various DSP algorithms and applications: Communications, Audio and video processing, Graphics, image enhancement, 3- D rendering, Frequency domain filtering - FIR and IIR, Frequency- time transformations – FFT. Basic architecture of DSP kits, programming concepts for various real time systems.

14M14EC336 Performance Evaluation of Communication Systems

Introduction to Analog and Digital Communication Systems. Different types of modulation techniques and different types of shift keying methods (BPS, QPSK, FSK, and QAM). Random

variable theory, Random function, probability density function (PDF), cumulative distributive function (CDF) and moment generating functions. System Performance Measures like Average signal to noise ratio (SNR), Outage Probability, Average Bit error Probability (BEP), Coherent and Non-coherent detection, Fading Channel Characterization and modeling, Slow and fast fading, flat and frequency selective fading, Rayleigh, Nakagami-m, Rice, Weibull and Beckmann distribution . Integrals involving the Gaussian Q function, Marcum Q function, Probability of error expression in different types of fading channel. Performance of multi channel receivers (diversity), performance of multi-user communication, multi-carrier communication systems.

14M14EC337 Spread Spectrum Theory

Pseudo-random codes, modulation and demodulation techniques, synchronization, statistical distributions, direct sequence (DS) and frequency hopping (FH) spread spectrum, and capacity calculation for a CDMA system. Students gain an overview of wireless architecture, spread spectrum communication, statistical distributions used in wireless communication, design of optimum receivers, calculation of theoretical capacity of a CDMA system, coding and decoding processes in CDMA, effects of interference in CDMA, and synchronization in CDMA wireless communication systems. 3G wireless systems using CDMA technologies are also studied in this course.

14M14EC338 Synthesis of Digital Systems

Digital Logic Design Review, Verilog Hardware Description Language (HDL),Programmable Logic Architecture and LPMs, Timing Constraints and Timing Models in Programmable Logic, Pipelining for Increased Throughput, Sequential Logic Synthesis using Verilog, Mealy & Moore Models, Analysis & Synthesis of Synchronous sequential circuits, Digital system design Hierarchy, ASM charts, Hardware description language, Control logic Design Reduction of state tables, State Assignments, Analysis and synthesis of Asynchronous sequential circuits, critical and non-critical races, Essential Hazard, Fault Modeling, Fault classes and models – Stuck at faults, Bridging faults, transition and intermittent faults. Fault Diagnosis of combination circuits by conventional methods-Path sensitization technique, Boolean different method and Kohavi algorithm.

14M14EC339 Wireless Networks

Wireless and Mobile Network Architecture: Principle of Cellular Communication, Overview 1G, 2G, 2.5G and 3G and 4G technologies. GSM Architecture and Mobility management hand off management, Network signaling. Mobile Computing fundamental challenges, Mobile Devices –PDA and mobile OS, PalmOs, Win CE and Symbian. Mobile IP Protocol Architecture: Mobile IP and IP v 6 and its application in mobile computing, Cellular Digital Packet Data CDPD, VOIP, GPRS Services, Wireless Local Loop-WLL system. Wireless Application Protocol (WAP): The Wireless Application Protocol application environment, wireless application protocol client software, hardware and websites, wireless application protocol gateways, implementing enterprise wireless application protocol strategy. Wireless Markup Language: An Introduction to Wireless Technologies, Markup Languages , An Introduction to XML, Fundamentals of WML., Writing and Formatting Text , Navigating Between Cards and Decks, Displaying Images, Tables, Using Variables, Acquiring User Input. Wireless Markup Language Script: An Introduction to WMLScript, WMLScript Control Structures, Events, Phone.com Extensions, Usability. Application of Mobile computing: ASP and Dynamic WAP Sites, XML and XSLT, Dynamic WML Generation with ASP and XSLT, Developing WAP Applications using Emulators. Distributed Mobile Computing: Distributed OS and file systems, Mobile Computing Software (Pervasive Computing) Development Strategies and tools, Data Management for Mobile Computing.

14M19CI391 Seminar-I
The objective of Seminar-I is to analyse the topic of seminar with scope of work. This course helps to collect useful information from the literature on the assigned topic. One faculty assigned to each M. Tech student. Usually the assigned faculty suggest a particular research topic to the concern student. Subsequently student collects research papers. The faculty assigned/ supervisor gives one / two research paper and advice the student to make detail study on

    a. Authors contribution
    b. Mathematical analysis

c. Performance comparison parameters

The Seminar-I is an independent subject, not related to Dissertation, Part-I.

14M19CI392 Dissertation, Part-I

The objective of Dissertation, Part-I is to promote to analyze the title and proposed a model for Dissertation. To study of literature survey, formulate the research problem and develop necessary methodology related to research problem. A workable design/ algorithm to be developed based on the proposed methodology, algorithm a design to be noted.

Year/Sem: IInd Year/ IVth Sem

14M14MA431 Wavelets and Applications

Basics of linear algebra, Fourier series and Fourier transform. The problem of approximation of functions in various spaces, Inner product, Norm, Orthogonality, Banach and Hilbert spaces, B-splines. Wavelet basics, Haar, Morlet, Meyer and Daubechies wavelets. Design of wavelets. Orthogonal and biorthogonal bases. Wavelet Transforms. Multiresolution analysis. Compactly supported wavelets. Cardinal spline wavelets. Numerical algorithms. Discrete time bases, series expansions of discrete time signals, DWT. Analysis and design of filter banks, Orthogonal and biorthogonal filter banks, Tree structured and linear phase filter banks. Subband filtering. Applications to Image and Video compression, solution of differential and integral equations. Wavelet software- Matlab, LabVIEW etc.

14M114EC432 Electromagnetic Theory for Microwaves & Fiber Optics

Basic Electromagnetic Theory: Maxwell's Equations, Boundary conditions, Wave Equations, Poynting's Theorem. Scalar and Vector Potentials. Plane Wave Propagation: Sinusoidal uniform plane waves, Wave polarization, Reflection and refraction. Time – Varying Boundary Value Problems: The Uniqueness Theorem, Solution of Helmholtz equations in rectangular and circular cylindrical coordinates, Vector Eigen functions and normal modes. Metallic Waveguides: Classification of wave solutions, General Characteristics of metallic waveguides, Rectangular hollow waveguides, Circular cylindrical hollow waveguides. Dielectric Waveguides: Circular cylindrical waveguides and optical fibers. Periodic Structures: Characteristics of slow waves, Periodic systems, Disk-loaded waveguide, The Sheath helix and the tape helix models. Electromagnetic Waves in Dispersive Media: Classical theory of dispersion in material media, Wave velocities. Waves in Electron beams: Permittivity tensor for an electron beam, Space charge waves. Gaussian beams: Fundamental Gaussian beams. Characteristics of Gaussian beams. Higher-order modes of Gaussian beams.

14M19CI491 Seminar-II

The objective of Seminar-II is to analyse the topic of seminar with scope of work. This course helps to collect useful information from the literature on the assigned topic. One faculty assigned to each M. Tech student. Usually the assigned faculty suggest a particular research topic to the concern student. Subsequently student collects research papers. The faculty assigned/ supervisor gives one / two research paper and advice the student to make detail study on

a. Authors contribution
b. Mathematical analysis
c. Performance comparison parameters

The Seminar- II is an independent subject, not related to Seminar-I and Dissertation, Part-II.

14M19CI492 Dissertation, Part-II

Dissertation, Part-II should be seen in continuation with Dissertation and proposed a model for Dissertation. To study of literature survey, formulate the research problem and develop necessary methodology related to research problem. A workable design/ algorithm to be developed based on the proposed methodology, algorithm a design to be noted.