Kalinga University Atal Nagar (C.G.)

SCHEME OF EXAMINATION

& SYLLABUS

of

M.Tech Electronics & Telecommunication

Electronics & Communication Engineering

UNDER

Faculty of Engineering and Technology

w.e.f. Session 2021-22

Kalinga University, Raipur

M.Tech Electronics & Telecommunication
Electronics & Communication Engineering

W.e.f 2021-22 Session

Semester –I					
Code No.	**Paper**	**Credits**	**End Semester Exam**	**Internal Marks**	**Total Marks**
MTEC101	Advanced Mathematics for Engineers	4	100	50	150
MTEC102	Electronics System Design	4	100	50	150
MTEC103	Data Communication Network	4	100	50	150
MTEC104	Advanced Comm. Systems	4	100	50	150
	Elective – I	4	100	50	150
MTEC105A	Advanced Microprocessor & Embedded Systems				
MTEC105B	VLSI Design				
MTEC105C	Reliability of Electronics Comm. Systems				
MTEC106-P	Lab-I	2	30	20	50
	Total	**22**	**530**	**270**	**800**
Semester –II					
Code No.	**Paper**	**Credits**	**End Semester Exam**	**Internal Marks**	**Total Marks**
MTEC201	Optical Communication Systems	4	100	50	150
MTEC202	Digital Speech & Image Processing	4	100	50	150
MTEC203	Information Theory and Coding	4	100	50	150
MTEC204	Neural Network & Fuzzy Logic	4	100	50	150
	Elective – II	4	100	50	150
MTEC205A	Multimedia Comm. Systems				
MTEC205B	Parallel Processing				
MTEC205C	Peripheral System Design & Interfacing				

MTEC206-P	Lab-II	2	30	20	50
	Total	**22**	**530**	**270**	**800**
Semester –III					
Code No.	**Paper**	**Credits**	**End Semester Exam**	**Internal Marks**	**Total Marks**
MTEC301	Microelectronics Technology	4	100	50	150
MTEC302	RF Microwave & Antenna Theory	4	100	50	150
	Elective – III	4	100	50	150
MTEC303A	Modeling & Simulation of Comm. Systems				
MTEC303B	Microwave Theory & Technique				
MTEC303C	Detection & Estimation Theory				
MTEC303D	Wireless & Mobile Communication				
MTEC304	Preliminary work on Dissertation	9	100	50	150
MTEC305	Seminar Based on Dissertation	1	100	50	150
	Total	**22**	**500**	**250**	**750**
Semester –IV					
Code No.	**Paper**	**Credits**	**End Semester Exam**	**Internal Marks**	**Total Marks**
MTEC401	Dissertation	18	300	200	500
	Total	**18**	**300**	**200**	**500**

SEMESTER-I

MTEC101

Advanced Mathematics for Engineers

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 –Transforms-Introduction, Properties of Z- Transforms, Evaluation of inverse Z – Transforms.

Unit 3

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

Unit 4

Conformal Mapping-Conformal mapping, linear 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.

References:

1. Higher Engineering Mathematics - by Dr. B.S. Grewal; Khanna Publishers
2. Fourier Series and Boundary Values Problems - by Churchill; McGraw Hill.
3. Complex Variables & Applications - by Churchill; McGraw Hill.
4. Calculus of Variations - by Elsgole; Addison Wesley.
5. Calculus of Variations - by Galfand & Fomin; Prentice Hall.
6. The Use of Integral Transforms - by I.N. Sneddon., Tata McGraw Hill.

MTEC102

Electronics System Design

Unit 1

Review of Digital electronics concept-

MSI and LSI Circuits And Their Applications- Logic families and their applications, Combinational-Circuit Analysis, Combinational-Circuit Synthesis ,Comparators, Multiplexers, Code Converters, XOR And ANDOR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System..

Unit 2

Sequential Machines-Bitable Elements, Latches and Flip-Flops, Clocked Synchronous State Machine Analysis and Design, Shift Registers and Memory, Counters Conversion, Clocking Aspects , Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders,

Unit 3

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

Unit 4

Synchronizing Two System And Choosing Controller, Architecture, State Assignment, Next State Decoders And Its Maps, Output Decoders, Indirect Addressed Multiplexers Configurations, Programmable System Controllers,

Unit 5

Asynchronous Finite State Machines- — primitive flow table , concept of race, critical race and hazards Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, , Clock Skew, Plotting And Reading The Excitation Map, Hazards, , FPGA architecture(Xilinx/ Altera) , ROM, PLA And PAL Based Design

References:

1. An Engineering Approach To Digital Design - by Fletcher PHI 1990
2. Designing With TTL Circuits - by Texas Instruments.
3. Related IEEE/IEE publications

MTEC103

Data Communication Network

Unit 1

Data Transmission-Overview of Data Communication and networking, Analog And Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding.

Digital Data Communication Techniques-Asynchronous And Synchronous Transmission, Error Detection and correction techniques, Physical interfaces.

Unit 2

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

Multiplexing-F.D.M. Synchronous TDM, Statistical TDM.

Unit 3

Switching and Computer Networks-Communication Networks, Circuit Switching, Message Switching, Packet Switching,X.25, Virtual circuits and Data gram's, LAN/MAN Technologies, Medium Access control protocols (CSMA/CD, Token ring, FDDI, DQDB).

Unit 4

Computer Communication Architecture-OSI and TCP/IP Model, Protocol And Architecture, Inter Networking, IP addressing,structure of IP, IPv4, IPv6, Transport layer Protocols, Session Service And Protocols,and Presentation/Application Controls.

Unit 5

ATM Networks-Concepts, history, Architecture, Convergence and challenges

Network Operating Systems-Overview of network operating systems (Windows NT/Unix/Linux), Mobile IP33N Operating System

Network security- Security issues, concept of firewalls, intrusion detection Systems.

References:

1. Data And Computer Communication - by William Stallings, Prentice Hall, 4th Ed.
2. Computer Networking - by Andrew Tanenbaum.
3. Data communications and networking - by Forouzan
5. Engg. approach to Computer Networking - by Srinivasan Keshav, Pearson Edu.
6. Data Networks - by Bertsekas prentice Hall
7. Related IEEE/IEE publications

MTEC104

Advanced Comm. Systems

Unit 1
Introduction-Introduction to communications systems, analog and digital communication systems, Applications of communication systems.

Unit 2
Digital Communication-Introduction, Digital Modulation techniques, BPSK, QPSK, PCM, DPCM, Delta Modulation, Digital Transmission and Transmission Impairments.

Unit 3
Optical Networks-WDM, TDM, Telecommunication Infrastructure, Switching, 3G systems, SONET, SDH, Architecture of Optical Transport Network, Link Management Protocols,Solutions.

Unit 4
Satellite Communication-Basic Transmission Theory, System Noise Temperature and G/T Ratio, Design Of Down Links, Domestic Satellite Systems Using Small Earth Stations, Uplink Design, Design Of Satellite Link For Specified (C/N). Multiple Access Techniques, Frequency Division Multiple Access (FDMA), TDMA, CDMA, Estimating Channel Requirements, Practical Demand Access Systems, Random Access, Multiple Access With On Board Processing. VSAT.

Unit 5
Mobile Communications-Mobile telephone service, Transmission protocols, Introduction to GSM, GPRS,CDMA, Switching techniques, Fading, Quality of service (QOS).

References:

1. Advanced Communication Systems - by Wayne Tomasi; Pearson.
2. Digital Communication - by Proakis; PHI
3. Optical Networks - by Uyless Black; Pearson
4. Satellite Communication - by Timothy Pratt; Addison Wesley.
5. Related IEEE/IEE publications

MTEC105A

Advanced Microprocessor & Embedded Systems

Unit 1

Microprocessor Architectural Concepts-Review of 16-bit Microprocessor Architecture, Word Lengths, Addressable Memory, Microprocessor Speed, Architecture Characteristics, Registers, Instructions, Memory Addressing Architecture, ALU, GPR's, Control Logic And Internal Data Bus, Introduction to Pentium Architecture.

Unit 2

Microprocessor Instructions And Communications-Instruction Set, Mnemonics, Basic Instruction Types, Addressing Modes, Interfacing I/O Microprocessor, Polling And Interrupts, Interrupts And DMA.

Unit 3

Microprocessor I/O-Data Communication, Parallel I/O Serial Communication, Serial Interface And UART, Modem, I/O Devices, D/A & A/D Interface, Interface, Special I/O Devices.

Unit 4

Embedded Controllers & Systems-Architecture of 80186 & 80188 CPU subsystems, Addressing Modes, Instruction set,Basic IO subsystems, Memory Subsystem, Example embedded controllers.

References:

1. Intel Series Of Microprocessors: By Berry B. Bray, TMH.
2. 8086 microprocessor & Architecture by Liu, Gibson; PHI.
3. Embedded Microprocessor System Design by Kenneth L. Short, Pearson Education.
4. Embedded Controllers by Berry B. Bray Pearson Education.
5. Related IEEE/IEE publications

MTEC105B

VLSI Design

Unit 1

Overview-Overview of combinational and sequential circuits, timing analysis of combinational and sequential circuits, meta-stability, methods to eliminate meta-stability single synchronizer and double synchronizer, MTBF Clocking strategies.

Unit 2

Sequential Machine Design-State diagram, state minimization, state assignments, design of mealy and Moore machines, design of RAM, SDR, SRAM, DRAM, ROM. Charge Coupled Devices (CCD's).

Unit 3

Programmable logic Devices-Basic concepts, programmable logic array (PLA), Programmable Array Logic (PAL),Structure of standard PLD's Complex (PLD's), Complex PLD's (CPLD), Xilinx Xc- 9500. Introduction to field programmable gate arrays-types of FPGA's, Configurable logic Block (CLB) Input/ Output Block (IOB). Introduction to Xilinx series. FPGA, XC4000 family, Implementation of Design in PLD's.

Unit 4

VHDL-Need for HDL's, Design flow, overview of VHDL, data types, Logic Operators, Data flow Modeling, Structural Modeling, Behavioral Modeling, Mixed Modeling, Modeling of combinational and sequential circuits.

Unit 5

Verilog-Verilog as HDL, HDL model abstraction-behavioral, RTL, structural, switch model,verification, Modeling of combinational logic, sequential logic, tasks and functions,Advanced Modeling concepts, User defined primitives.

References:

1. Fundamentals of Digital Design - by Charles. H. Roth, Jr., Jaico Publishing House
2. Digital Design Principle & Practice – by John. F. Wakerly, PHI
3. VHDL Analysis & Modeling of Digital Systems – by Z Navabi, Mc. Graw Hill
4. An Engg. Approach to Digital Design - by William. I. Fletcher
5. Verilog HDL: Digital Design & Synthesis – by Samir Palnitker
6. Documents of Xilinx]
7. Related IEEE/IEE publications

MTEC105C

Reliability of Electronics Comm. Systems

Unit 1

Concept of reliability-Failures of systems and its modes. Measure of Reliability, Reliability function, Hazard rate MTBF and their interrelations.

Unit 2

Reliability Data and Analysis-Data sources. Data collection, use of Reliability Data, Reliability Analysis,Performance Parameters, calculation of failure rate, Application of Weibill distribution.

Unit 3

System Reliability and Modeling-Series systems, Parallel system, series parallel systems. Time dependence, Reliability Determination, Stand by systems, r out of n, Configurations, Methods of tie set and cut sets of Or reliability evaluation, simulation and Reliability prediction. Monte Carlo method, concepts of network topology. Overall reliability evolution.

Unit 4

Maintainability and Availability-Maintainability and its equation. Factors Affecting maintainability. Measures of Maintainability, Mean Down Time, Availability Intrinsic availability equipment availability & Mission availability. Replacement processes and Policies.

Unit 5

Life Testing of Equipments-Non-destructive tests, destruction tests and their Mathematic modeling. Quality and Reliability, Measurement & prediction of Human Reliability, Reliability and safety, safety margins in critical Devices, case studies.

Value Engineering-Techniques in value Engg; Structure of value Engg. Reliability Management.

References:

1. Reliability Engg. By Govil, 1992.
2. Reliability Engg. By Dr.A.K.Aggarwal, 1992.
3. Related IEEE/IEE publications

MTEC106-P

Lab-I

At least ten experiments are to be performed related to the subjects taught in 1st semester.

SEMESTER-II

MTEC201

Optical Communication Systems

Unit 1

Introduction to optical fibers- Wave propagation Dispersion and its limitations, losses and non-linear effects

Optical transmitters-LEDs Semiconductor lasers and their characteristics. Transmitter Design.

Unit 2

Optical receiver-Photo detectors and their characteristics. Receiver Design. Noise and Sensitivity in Optical Receivers Sensitivity degradation

Unit 3

Optical Amplifiers-Semiconductor Optical Amplifier Raman Amplifier. EDFA

Dispersion management-Need Pre-compensation Schemes Best Compensation Techniques. Dispersion Compensatory Fibers Optical Filters Fiber Bragg Grating.

Unit 4

Multichannel Systems-WDM Light wave Systems WDM Components System Performance tissues TDM. CDM.

Unit 5

Solution Systems-Fiber Solutions Soliton based Communications Loss Managed Solitons Dispersion - Managed Solitons High Speed Soliton Systems WDM Soliton Systems

References:

1. Fiber-Optic Communication Systems - by GP Aggarwal - John Wiley & Sons
2. Fiber-Optic Communication Systems - by Mynbev - John Wiley & Sons
3. Related IEEE/IEE publications

MTEC202

Digital Speech & Image Processing

Unit 1
Review of Filter design. Linear phase FIR filters. Methods of FIR filter design.Methods of IIR filter design. Applications of FIR & IIR filters in speech, image,seismic, medical and other areas.

Unit 2
Speech Processing-Review of human speech and Acoustic theory, nature of sound, harmonics, resonance measurement, virtual display. Music theory, pitch, duration, intervals, rhythm. Human speech production, the vocal tract, the Larynx, the source filter.

Unit 3
Speech signal processing-the phasor mode, Fourier transfer, DFT, FFT. The hardware use of FIR &IIR filters.Software, Elements of speech Synthesis-speech Recognition-speech in the computer-human interface.

Unit 4
Image Processing-Characterization of images as two-dimensional discrete fields, unitary transforms—DFT. Hadamard, slant and cosine transforms, compression schemes-Karhunen Loeve compression predictive coding schemes.

Unit 5
Image enhancement-gray scale modification, edge enhancement, restoration-Wiener filtering, constrained deconvolution, recursive filtering. Segmentation, edge detection, thresholding, textural properties, geometry and shape description.

References:

1. Digital Signal Processing - by Proakis & Manolakis
2. Speech and Audio Processing for multimedia PC's - by Iain Murray
3. Digital Image Processing - by Keenneth R Castleman, Pearson Education Society.
4. Digital Image Processing - by Rafact Gonzalez and Richard E. Woods, Pearson Education Society.
5. Related IEEE/IEE publications

MTEC203

Information Theory and Coding

Unit 1

Elements of information theory-Source coding theorem, Huffman coding, Channel coding theorem, channel capacity theorem, Shenonfano theorem, entropy

Unit 2

Sampling Process-Base band and band pass sampling theorems reconstruction from samples, Practical aspects of sampling and signal recovery TDM

Unit 3

Waveform Coding Techniques-PCM Channel noise and error probability DPCM and DM Coding speech at low bit rates Prediction and adaptive filters. Base band shaping for data transmission, PAM signals and their power spectra Nyquist criterion ISI and eye pattern Equalization.

Unit 4

Digital Modulation Techniques-Binary and M-ary modulation techniques, Coherent and non-coherent detection, Bit Vs symbol error probability and bandwidth efficiency. Bit error analysis, using orthogonal Signaling

Unit 5

Error Control Coding-Rationale for coding Linbear block codes, cyclic codes and convolution codes Viterbi decoding algorithm and trellis codes.

References:

1. Principles of digitals communication: J. Dass. , S.K. Malik & P.K. Chatterjee,1991.
2. Introduction to the theory of Error correcting codes: Vera Press, 1992
3. Information Theory and Reliable Communication: Robert G. Gallanger Mc Graw Hill, 1992
4. Related IEEE/IEE publications

MTEC204

Neural Network & Fuzzy Logic

Unit 1

Neural networks characteristics, History of development in neural networks principles, Artificial neural net terminology, Model of a neuron, Topology, Learning, types of learning, Supervised, Unsupervised, Re-inforcement learning. Knowledge representation and acquisition.

Unit 2

Basic Hop field model, Basic learning laws, Unsupervised learning, Competitive learning, K-means clustering algorithm, Kohonen`s feature maps.

Unit 3

Radial basis function neural networks, Basic learning laws in RBF nets, Recurrent back propagation, Introduction to counter propagation networks, CMAC network, and ART networks.

Unit 4

Applications of neural nets such as pattern recognition, Optimization, Associative memories, speech and decision-making. VLSI implementation of neural networks.

Unit 5

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

References:

1. Neural Networks - by Simon Haykin
2. Fuzzy logic with engineering application - by ROSS J.T (Tata Mc)
3. Neural Networks & Fuzzy Logic - by Bart Kosko
4. Neural computing theory & practice - by P.D. wasserman (ANZA PUB).
5. Introduction to applied Fuzzy Electronics-Ahmad M.Ibrahim (PHI)
6. Introduction to artificial neural systems - by J.M. Zurada.(Jaico Pub)
7. An introduction to Fuzzy control - by D. Driankor, H. Hellendorn, M. Reinfrank (Narosa Pub.)
8. Fuzzy Neural Control - by Junhong NIE & DEREK LINKERS (PHI)
9. Related IEEE/IEE publications
10. Fuzzy System Design Principles, Building Fuzzy IF-THEN Rule Bases – by Riza C.Berkiu & Trubatch, IEEE Press

MTEC205A

Multimedia Comm. Systems

Unit 1

Multimedia Communications-Introduction to various multimedia comm. Techniques, Applications, Networks,Protocols and Standards, bandwidth and compression issues.

Unit 2

Digital Communication basics-Source encoding, Channel encoding, Circuit switched Networks; Packet switched networks, ATM, Frame Relay.

Multimedia Information Representation-Different types of multimedia information, Information representation.

Unit 3

Compression Techniques-Encoding and decoding techniques, Text compression techniques, Image compression techniques, Audio and Video Compression, Standards for Multimedia Compression, Huffman, Run length, Variable length, Lossy/ Lossless compression.

Unit 4

Multimedia File Formats-Various files formats for multimedia and their applications, BMP, PNG, TIFF, JPEG,DFX, AVI, MPEG Audio/ Video Standards, Challenges for encryption and decryption.

Unit 5

World Wide Web-The Internet, Internet Multimedia Applications, Enterprise networks, Entertainment Networks, High Speed Modems, Application Support Functions, Audio/ Video Streaming, Video Conferencing.

References:

1. Multimedia Communications by Fred Halsall, Prentice Hall.
2. Digital Communication by Proakis, Prentice Hall.
3. Internet Resources.
4. Related IEEE/IEE publications

MTEC205B

Parallel Processing

Unit 1

Theory Of Parallelism-Parallel computer models - the state of computing, Multiprocessors and Multicomputers and Multivectors and SIMD computers, PRAM and VLSI models, Architectural development tracks. Program and network properties Conditions of parallelism, Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures.

Unit 2

Principles of scalable performance - performance matrices and measures, parallel processing applications, speedup performance laws, scalability analysis and approaches.

Unit 3

Hardware Technologies-Processor and memory hierarchy advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology, bus cache and shared memory - backplane bus systems, cache memory organisations, shared memory organisations, sequential and weak consistency models.

Unit 4

Pipelining And Superscalar Technologies-Parallel and scalable architectures, Multiprocessor and Multicomputers, Multivector and SIMD computers, Scalable, Multithreaded and data flow architectures.

Unit 5

Software And Parallel Programming-Parallel models, Languages and compilers, Parallel program development and environments, UNIX, MACH and OSF/1 for parallel computers.

References:

1. Kai Hwang, "Advanced Computer Architecture", McGraw Hill International, 1993.
2. William Stallings, "Computer Organization and Architecture", MacmillanPublishing Company, 1990.
3. M. J. Quinn, "Designing Efficient Algorithms for Parallel Computers", McGraw Hill International, 1994.
4. John L. Hennessy and David A. Patterson, Computer Architecture A Quantitative approach, Morgan Kaufman Publishers. Inc., 1990.
5. D.P. Siewiorek, G.G. Bell, A. Newell, Computer Structures, Principle and Examples, McGraw Hill, 1982.
6. Related IEEE/IEE publications

MTEC205C

Peripheral System Design & Interfacing

Unit 1

Bus system-Bus systems in microcomputers ST 100 bus, Multi bus, EISA, PCI Bus, HP IB/GPIB Bus, Bus and their applications. I/O.

Interface-Standard I/O interfaces RS-232 C, RS-232 D Centronics interface, current loop interface, and RS-449 communication interface.

Unit 2

Design criterion with PCs-Application of PC buses (ISA, EISA, PCI, VESA-VL) and associated signals, Handshakes, I/O and Interrupt map, Programming methodology for input/output application, GPIB signals and GPIB programming techniques operating system calls.

Unit 3

Peripherals-Peripherals like CRT controller, Communication controllers, DMA controller,Programmable keyboard/Display interfaces and Associated circuitries.

Unit 4

Controllers-PID controllers, Programmable logic controllers, PC based data acquisition system, Interfacing PC to various cards- Stepper motor milli volts, Milliamps.

Unit 5

Development tools-Microprocessor development system, cross compilers, Simulator In circuit emulators, Automated test equipments etc.

References:

1. Intelligent Instrumentation by George C. Barney, PHI.
2. Student Reference Manual For Electronics Instrumentation Labs by Stanley wolf and Richard F.M. Smith, PHI.
3. Instrumentation for Engg. Measurement by James W. dally, William F. Riley, John Wilay and Sons
4. Interfacing A Laboratory Approach by Deonzo, PHI
5. Related IEEE/IEE publications

MTEC206-P

Lab-II

At least ten experiments are to be performed related to the subjects taught in 2nd semester

SEMESTER-III

MTEC301

Microelectronics Technology

Unit 1

Review of MOS technology-Basic MOS transistors, enhancement and depletion model transistors, N-MOS and CMOS processor, thermal aspects of processing, and production of masks.

Unit 2

Electrical properties of MOS circuit- Parameters of MOS transistors, pass transistor, N-MOS inverter, pull-up to pull down ratio for an N-MOS inverter, C-MOS inverters, MOS transistor circuit model, latch up on C-MOS circuits.

Unit 3

Design processes-MOS layers, stick diagram, design rules, AWA OX C-MOS process description, double metal single poly silicon C-MOS process.

Unit 4

Basic circuit concepts-Sheets resistance, area capacitance delay unit, inverter delay, super buffers, propagation delays.

Unit 5

Subsystem design & layout-Architectural issues, switch logic, gate logic, examples of combinational logic,clocked sequential circuits, and other system consideration.

Scaling of MOS circuits-Scaling factor, limitations, scaling of wires and inter connections

References:

1. Basic VLSI design systems & circuits - by DA. And Eshrachian K (phi), 1988.
2. VLSI design techniques for analog & digital circuit - by Geigar BR, Allen PE & Strader ME (Mc graw hill 1990).
3. Related IEEE/IEE publications

MTEC302

RF Microwave & Antenna Theory

Unit 1

Introduction-RF and Microwaves, Review of Maxwell equations, properties of RF and Microwaves. Applications of RF/Microwave – Communications, Radar, Navigation, Remote sensing, Wireless applications.

Unit 2

RF and Microwave Circuit design-Low RF Circuit design considerations, high RF and microwave circuits, lumped and distributed circuit elements. S-parameters description of passive and active networks, Network concepts: obstacles in wave guides, waveguide function, excitations of wave guides and cavities.

Unit 3

RF Electronic concepts-Resonant circuits; Analysis of a simple circuit in Phasor domain; loaded Q, Impedance transformation, Insertion loss, Impendence transformers: Tapped-C transformer, Tapped-L Transformer.

Unit 4

RF Impedance Matching: The L-Network, the Absorption Method, and the Resonance Method.
Microwave Antenna Theory-Concepts of radtrlion, Dipoles, Aperture Antennas, Reflectors, Horns, Slot antennas,printed antennas, broad -band antenna, mutual coupling, arrays and phase arrays.

Unit 5

Lens antennas low frequency active antenna. Antennas and wireless communication.

References:

1. Radio Frequency & Microwave Electronics-Mathew. M. Radmanesh (Pearson Education Asia)
2. Foundation of Microwave Engineering - by RE Collin
3. Antenna and Radio Wave Propagation – by RE Collin
4. Antennas: Theory and Practice – by R Chatterjee
5. Related IEEE/IEE publications

MTEC303A

Modeling & Simulation of Comm. Systems

Unit 1

Introduction-Concept of Simulation, System, Model, Types of Model, Univariat & Multivariat Models, Deterministic & Stochastic models, Continuous & Discreet Models, Analog & Digital Simulation, Real Time Simulation, Hybrid Simulation, Advantages & Limitations of Simulation, Steps in Simulation Study

Unit 2

Random Number-Psedue Random Numbers, Generation of random numbers, properties & testing of random numbers, generation of random variables using common distributions, Bounds and approximations of Random processes.

Unit 3

Review of signals and systems, Continuous & discrete LT systems. Simulation of random variables & random processors, Transformation functions, transformations of random processes, sampling & quantization for simulation

Unit 4

Modeling of communication system-Information sources encoding/decoding, base band modulation and mapping, RF and optical modulation demodulation, Filtering communication channels and models, Noise interference and error, Control coding, Synchronization, Spread spectrum techniques.

Unit 5

Simulation and modeling methodology-Simulation environment, Modeling consideration, Performance evaluation techniques,Error sources in simulation, design of simulation experiment – length of run, replication, elimination of initial bias, variance reduction techniques.
PSpice-Simulation of analog systems using PSpice
Case studies-Case study of 64-OAM equalized digital radio link in a fading environment and satellite system.

References:

1. Simulation of Communication Systems by M.C. Jeruchim & Others, Plenum Press.
2. Modern Digital and Communication Systems by Lathi B.P.
3. System Simulation – by DS Hira
4. Discreet Event System Simulation – by Banks, Carsen, Nelson, Persian Edu. Asia.
5. Related IEEE/IEE publications

MTEC303B

Microwave Theory & Technique

Unit 1

Electromagnetic Waves-Review of electromagnetic field equation and their rotation. Comparison of plane waves & transmission Line quantities. Skin depth, Propagation constant, Attenuation constant & phase constant,. Electric & Magnetic fields in ellipsoids, Method of calculation, Circular polarization, Demagnetizing Factors & Depolarizing Factors.

Unit 2

Transmission Lines-Matrix Representation of network: The impedance matrix, The admittance matrix, The Cascade matrix, Transmission line parameters, Telegraphists' equations. The Propagation of Waves on Transmission Lines: The wave equation, Solution of wave equations, Characteristics impedance and characteristics admittance, Power, Terminated lines, Short circuited line, Open Circuited Line, Lumped-Element Equivalents of Lines.

Unit 3

Transmission: Line Application & Techniques; The Quarter-wave Transformer, Stub Matching, Binomial Matching, Line Connections, The Parallel-Plate Line, The Coaxial Line, Application of Conformal Mapping, The strip transmission Line.

Elementary Theory of Wave guides-Review of rectangular & circular wave guides. Inhomogeneously Filled Wave guides: Dielectric Slab- Loaded Rectangular Guides, The ray leigh - Qitz method, Ferrite slabs in rectangular guides, Excitation of different modes in a wave guide. Perturbation techniques & its application, Vvariation techniques & its application.

Unit 4

Microwave components-Microwave Amplifier: Design using s-parameter, stability criteria, Constant power & gain circles. Parametric amplifiers, Oscillators & Mixers: Gunn oscillators, IMPATT diodes, TRAPATT diodes, BARITT diodes, Transited oscillators, Oscillator circuit. Mixers, Mixers noise figure, Mixed analysis. Microwave filter design based on binomial and chebychev quarterwave transforms, Impedance & Admittance coupled cavity filters and other types.

Unit 5

Introduction to monolithic microwave integrated circuits. Hybrid integrated circuits, Microwave measurements, Dielectric constant of low loss & high loss material.

References:

1. Field Theory of guided waves by R.E.Collin
2. Theory of Guided Electromagnetic waves by R.A. Waldron
3. Microwave Propagation & Techniques by D.C. Sarkar
4. Related IEEE/IEE publications

MTEC303C

Detection & Estimation Theory

Unit 1

Statical communication theory-Representation of deterministic signals, orthogonal representation of signals.Dimensionality of signal spaces. Construction of orthogonal basis functions. Timebandwidth relationship: RMS duration and bandwidth, uncertainty relations.

Unit 2

Review of random processes-Definition and classification, stochastic integrals, Fourier transforms of random processes, stationary and non-stationary processes, correlation functions. Ergodicity, power spectral density, transformations of random processes by linear systems.

Unit 3

Representation of random processes (via sampling, K-L expansion & narrow band representations), special random processes (white gaussian noise, Wiener-Levy processes, special random processes, shot-noise processes Markov processes).

Unit 4

Optimum filtering-Matched filters for deterministic signals in white and coloured gaussian noise. Wiener filters for random signals in white and coloured gaussian noise. Discrete and continuous time filters.

Unit 5

Detection and estimation theory-Hypothesis testing- Bayes, Minimax and Neyman-Pearson criteria, Types of estimates and error bounds, General gaussian problem, Detection and estimation in coloured noise, Elements sequential and non-parametric detection. Wiener-Hopf and Kalman filtering, Applications to communication, radar and sonar systems

References:

1. Detection Estimation and Modulation Theory - by HL Van Trees Wiley NewYork
2. Introduction to Statistical Signal Processing with Application - by MD Srinath, PK. Rajasekran, R.Viswamathan (PHI)
3. Signal detection theory - by Hancock and Wintz.
4. Detection of signals and noise - by AD Whalen.
5. Related IEEE/IEE publications

MTEC303D

Wireless & Mobile Communication

Unit 1
Introduction-Technical Background, Transmission Fundamentals, Communication Networks, Protocols and TCP/IP Suite
Wireless Communication Technology-Antennas and Propagation Signal, Encoding Techniques, Spread Spectrum Coding and Error Control

Unit 2
Wireless Networking-Satellite Communications, Cellular Transmission Principles, Cordless Systems and Wireless Local Loop Mobile IP and Wireless access protocol

Unit 3
Wireless LANs
Wireless LAN Technology, IEEE 802, 11 Wireless LAN standard.

Unit 4
CDMA Standards-System Architecture for CDMA. Network and Data Link Layers of CDMA. Signaling Applications in CDMA System. Voice Applications in CDMA System.

Unit 5
RF Engineering and Facilities-Wireless Data, Cellular Communication Fundamentals, GSM Architecture and Interfaces. Radio Link Features in GSM, GSM Logical Channels and Frame Structure. Speech Coding in GSM (Messages, Services and Call Flows in GSM).

References:

1. Applications of CDMA in Wireless/Personal Communications - by V K Garg, K Smolik
2. Principles and Applications of GSM - byV K Garg Prentice Hall
3. Wireless Communication and Networks - by Stallings
4. Mobile Communication Schiller Prentice Hall
5. Mobile Communication - by Lee, Pearson
6. Related IEEE/IEE publications

MTEC304

Preliminary work on Dissertation

The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports.

MTEC305

Seminar Based on Dissertation

The student will deliver a seminar on the topic chosen by him and approved by Departmental committee for evaluation at the end of semester

SEMESTER-IV

MTEC401

Dissertation

The student will submit a detailed Project Report on the topic approved by Departmental committee in a specified format and will also deliver a Presentation on the topic chosen at the end of semester.