MVN University

ELECTRONICS & COMMUNICATION ENGINEERING DEPARTMENT

SCHEME & SYLLABUS

M. TECH. (Regular)

M. TECH. (Part-Time)

MVN University, Palwal(Haryana)

Scheme of Studies & Syllabus 2013-14

Two year Regular Course: M.Tech. (ECE) with specialization in VLSI, Nano Technology, Microwave Engineering, Embedded System Design

Semester:I

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Advanced Engineering Mathematics	AHL 509	4	0	0	4	4
2	Advanced Microprocessor & Microcontroller	ECL 501	4	0	2	6	5
3	Advanced Digital Signal Processing	ECL 503	4	0	2	6	5
4	Digital Communication Techniques	ECL 505	4	0	0	4	4
5	Elective-I	* 6	3	0	0	3	3
	Total		19	0	4	23	21

***6** **Elective-I**

ECL 507 : Data Communication Networks

ECL 509 : Agri Electronics

ECL 511 : Space Communication

ECL 513 : Secure Comminication

ECL 515 : Communication & Information Theory

MVN University, Palwal(Haryana)

Scheme of Studies & Syllabus 2013-14

Two year Regular Course: M.Tech. (ECE) with specialization in VLSI, Nano Technology, Microwave Engineering, Embedded System Design

Semester:II

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Electronic System Design	ECL 502	4	0	2	6	5
2	Advanced Optical Communication	ECL 504	4	0	2	6	5
3	Telecommunication Switching Systems	ECL 506	4	0	0	4	4
4	Wireless and Mobile Communication	ECL 508	4	0	0	4	4
5	Elective-II	*7	3	0	0	3	3
	Total		19	0	4	23	21

***7 Elective-II**

ECL 512 : VLSI - I

ECL 514 : Nano Technology- I

ECL 516 : Microwave Engineering - I

ECL 518 : Embedded System Design - I

MVN University, Palwal(Haryana)

Scheme of Studies & Syllabus

Two year Regular Course: M.Tech. (ECE) with specialization in VLSI, Nano Technology, Microwave Engineering, Embedded System Design

Semester:III

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Artificial Neural Networks & Fuzzy Logic	ECL517	4	0	2	6	5
2	CDMA Technology	ECL519	4	0	0	4	4
3	Elective-III	*8	3	0	0	3	3
4	Seminar	ECC521	0	0	2	2	1
5	Major Project	ECD523	0	0	2	2	1
6	Dissertation Phase-I	ECD525	0	0	4	4	2
	Total		11	0	10	21	16

***8 Elective-III**

ECL 527	VLSI-II
ECL 529	Nano Technology-II
ECL 531	Microwave Engg-II
ECL 533	Embeded System Design-II

MVN University, Palwal(Haryana)

Scheme of Studies & Syllabus

Two year Regular Course: M.Tech. (ECE) with specialization in VLSI, Nano Technology, Microwave Engineering, Embedded System Design

Semester:IV

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Dissertation	ECD522	0	0	20	20	10
	Total		0	0	20	20	10

MVN University, Palwal(Haryana)

Scheme of Studies & Syllabus 2013-14

Three year Part Time Course:M.Tech(ECE) with specialization in VLSI, Nano Technology, Microwave Engineering, Embedded System Design

Semester:I

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Advanced Engineering Mathematics	AHL 509	4	0	0	4	4
2	Advanced Microprocessor & Microcontroller	ECL 501	4	0	2	6	5
3	Digital Communication Techniques	ECL 505	4	0	0	4	4
	Total		12	0	2	14	13

Semester:II

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Electronic System Design	ECL 502	4	0	2	6	5
2	Telecommunication Switching Systems	ECL 506	4	0	0	4	4
3	Wireless and Mobile Communication	ECL 508	4	0	0	4	4
	Total		12	0	2	14	13

MVN University, Palwal(Haryana)

Scheme of Studies & Syllabus 2013-14

Three year Part Time Course:M.Tech(ECE) with specialization in VLSI, Nano Technology, Microwave Engineering, Embedded System Design

Semester:III

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Advanced Digital Signal Processing	ECL503	4	0	2	6	5
2	CDMA Technology	ECL519	4	0	0	4	4
3	Elective-I	*6	3	0	0	3	3
	Total		11	0	2	13	12

***6 Elective-I**

ECL 507	Data Comm. Networks
ECL 509	Agri Electronics
ECL 511	Space Comm.
ECL 513	Secure Communication
ECL 515	Communication & Information Theory

Semester:IV

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Advanced Optical Communication	ECL504	4	0	2	6	5
2	Elective-II	*7	3	0	0	3	3
3	Seminar (Common with III sem regular M. Tech.)	ECC 521	0	0	2	2	1
4	Major Project (Common with III sem regular M. Tech.)	ECD 523	0	0	2	2	1
	Total		7	0	6	13	10

***7 Elective-II**

ECL 512	VLSI-I
ECL 514	Nano Technology-I
ECL 516	MWR Engg-I
ECL 518	ESD-I

MVN University, Palwal(Haryana)

Scheme of Studies & Syllabus 2013-14

Three year Part Time Course:M.Tech(ECE) with specialization in VLSI, Nano Technology, Microwave Engineering, Embedded System Design

Semester:V

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Artificial Neural Networks & Fuzzy Logic	ECL517	4	0	2	6	5
2	Elective-III	*8	3	0	0	3	3
3	Dissertation Phase-I	ECD 525	0	0	4	4	2
	Total		7	0	6	13	10

***8 Elective-III**

ECL 527	VLSI-II
ECL 529	Nano Tech.-II
ECL 531	Microwave Engineering-II
ECL 533	ESD-II

Semester:VI

S. No	Course Title	Paper Code	Teaching Schedule			Total	Credit
			L	T	P		
1	Dissertation	ECD 522	0	0	20	20	10
	Total		0	0	20	20	10

AHL 509	ADVANCED ENGINEERING MATHEMATICS	L	T	P	Cr
		4	0	0	4

Objective: Mathematics is essential tool in engineering subjects for simplification of complex electronics expressions and implementation of different mathematical techniques in different electronics applications.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

Unit 1: Linear Algebra

Vector spaces, subspaces, Linear dependence, Basis and Dimension, Inner product spaces, Gram- Schmidt Orthogonalization, Linear transformations, Kernels and Images , Matrix representation of linear transformation, Change of basis, Eigenvalues and Eigen vectors of linear operator, Quadratic form.

UNIT 2: Probability

Probability: Classical, Relative frequency and Axiomatic Definitions of Probability, Addition Rule, Conditional Probability, Multiplication Rule, Bayes' Theorem.

UNIT 3: Statistics

Random Variables: Discrete and Continuous Variables, Probability Mass, Probability Density and Cumulative Distribution Functions, Mathematical Expectation, Moments, Moment Generation Function. Standard Distribution: Uniform, Binomial, Geometric, Negative Binomial, Poisson, Exponential, Gamma and Normal.

SECTION – B

UNIT 4: Static and Dynamic Optimization

Linear Optimization, Some Continuous and Discrete Models, Algorithms, Duality Theory, Constrained and Unconstrained Non-linear Optimization, Necessary and Sufficient Conditions, Solution Procedures. Fundamental of Dynamic Programming, Principle of Optimality, Forward and Backward Approach and Applications.

UNIT 5: Interpolation and Non Linear Equations

Interpolation problem, Lagrangian polynomials, Least square approximations, Bisection method, Linear Interpolation methods, Newton's method, fixed-point method.

UNIT 6: Numerical Solution of Simultaneous Linear Equations and Ordinary Differential Equations

Elimination method, Gauss and Gauss-Jordan method, Jacobi's method, Gauss-Seidal method. Taylor series method, Euler and modified Euler method, Runge-Kutta methods, Milne's method.

Text Books:

1. Kenneth Hoffman and Ray Kunze, Linear Algebra,2nd Edition, PHI, 1992.
2. Erwin Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons, 2004.
3. Irwin Miller and Marylees Miller, John E. Freund's Mathematical Statistics, 6th Edition, , PHI, 2002.

Reference Books:

4. J. Medhi, Stochastic Processes, New Age International, New Delhi.
5. A Papoulis, Probability, Random Variables and Stochastic Processes, 3rd Edition, McGraw Hill.
6. John B Thomas, An Introduction to Applied Probability and Random Processes, John Wiley & Sons.
7. Hillier F S and Liebermann G J, Introduction to Operations Research, 7th Edition, McGraw Hill.
8. Simmons D M, Non Linear Programming for Operations Research, PHI.
9. Gupta S.C. & Kapoor V.K., Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
10. Goon A.M., Gupta M.K. & Dasgupta, Fundamentals of Statistics, Vol. 1, World Press.
11. Numerical Methods in Engg. & Science: B.S. Grewal.
12. Phillips - Theory & Applications & Numerical analysis, Elsevier
13. Applied Numerical Analysis: Curtis F. Gerald and Patrick G. Wheatley-Pearson, Education Ltd.

ECL 501	ADVANCED MICROPROCESSOR & MICROCONTROLLER	L	T	P	Cr
		4	0	2	5

Objective: To study the architecture and Instruction set of 8086, 80286, 80386, develop assembly language programs in 8086, study different peripheral devices and their interfacing to 8086 and study the architecture, programming and interfacing of 8051microcontroller.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction to Microprocessor

Architecture of 8086 : BIU, the queue, segment registers, instruction pointer, EU, Flag registers, addressing modes of 8086, instruction set of 8086, RAM/ROM address decoding.

UNIT 2: Programs and Interfacing

Program format, segment & end directives, Data & address naming directives- EQU, DB, DW, assume directives. Programs using 8086, conditional and unconditional jump, loop and string instructions, interfacing of 8086 to: keyboards-alpha numeric displays and stepper motor

UNIT 3: Other Microprocessors

Architecture, signal and system connection, operating modes Microprocessor 80286, 80386, 80486: System and operating modes, RISC machines.

SECTION – B

UNIT 4: Introduction of Microcontroller

Introduction to Microcontrollers, Microprocessors and Micro controllers, The Z80 and the 8051, four bit, Eight bit, Sixteen bit, thirty-two bit Micro controllers, Development System for Micro controllers. The 8051 Architecture & Introduction.

UNIT 5: Architecture of Microcontroller

8051 Micro controller Hardware, Input/output Pins, Ports and Circuits, External Memory, Counters and Timers, Serial Data input/output, Interrupts. Interfacing of ADC, sensors, keyboard and DAC using microcontrollers

UNIT 6: System Design Using Micro Processor & Microcontroller

Case studies – Traffic light control, washing machine control, DC & Stepper Motor.

Text Books:

1. B.Ram, "Advanced Microprocessor & interfacing", TMH.
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay, "The 8051

Microcontroller and Embedded Systems", Second Edition, Pearson Education 2008.

Reference Books:

1. D.V.Hall, "Microprocessor & interfacing program & Hardware", Tata McGraw Hills, 2006
2. Tribel & Single, "8088/8086 Microprocessor programming, interfacing, Hardware & Application", PHI.
3. Kenneth J. Ayala, "The 8051 Micro controller Architecture, programming & Applications".
4. Krishna Kant, "Microprocessors and Microcontrollers Architecture, programming and system design using 8085, 8086, 8051 and 8096". PHI 2007.
5. A K Ray, K M Bhurchandi, "Advanced Microprocessors and Peripherals", TMH, 2007.

LAB:

Note: At least ten experiments have to be performed during the semester. At least eight experiments should be performed from the list given below. Two experiments may either be performed from the given list or may be designed and set by the concerned faculty in consultation with H.O.D. as per the scope of the syllabus.

List of Experiments:

1. Programs for 16 bit Arithmetic operations (Using 8086).
2. Programs for Sorting and Searching (Using 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Interfacing ADC and DAC.
6. Parallel Communication between two MP Kits using Mode 1 and Mode 2 of 8255.
7. Interfacing and Programming 8279, 8259, and 8253.
8. Serial Communication between two MP Kits using 8251.
9. Interfacing and Programming of Stepper Motor and DC Motor Speed control.
10. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051microcontroller.
11. Programming and verifying Timer, Interrupts and UART operations in 8051 Microcontroller.
12. Communication between 8051 Microcontroller kit and PC.

ECL 503	ADVANCED DIGITAL SIGNAL PROCESSING	L	T	P	Cr
		4	0	2	5

Objective: The objective of this subject is to enable students to study advanced topics of digital signal processing which include modern transforms, fast computational algorithms, DSP processor structures, adaptive filter design, wavelet theory for Image, Video, Speech, Audio, multimedia and Communication Applications.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Advanced Digital Filter Design Techniques

Multiple band optimal FIR filters-designs of filters with simultaneous constraints in time and frequency response, optimization methods for designing IIR filters, comparison of optimum FIR filters and delay equalized elliptic filters.

UNIT 2: Multirate DSP

The basic sample rate alteration- time-domain characterization, frequency-domain characterization: Cascade equivalences, filters in sampling rate alteration systems, digital filter banks and their analysis and applications, multi level filter banks, estimations of spectra from finite-duration observation of signals.

UNIT 3: Linear Prediction and Optimum Liner Filters

Forward and backward linear prediction, AR Lattice and ARMA lattice – ladder filters, Wieners filters for filtering on prediction.

SECTION – B

UNIT 4: DSP Algorithms

The Goertzel algorithm, the chirp – z transform algorithm the Levinson – Durbin algorithms, the Schur algorithm, and other algorithms, computations of the DFT, concept of tunable digital filters.

UNIT 5: Signal Processing Hardware

Multipliers, dividers, different forms of FIR Hardware, multiplexing, DTTR, TDM to FDM translator, realization of frequency synthesizer, FET hardware realization, different FFT architectures, special FFT processors, convolvers, Lincoln laboratory FDP and the compatible computer configurations.

UNIT 6: System Applications of DSP

Speech: Model of speech production, speech analysis – synthesis system vocoder analyzers and synthesizers, linear prediction of speech. DTMF

Text Book:

1. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing. Principles, algorithms, and applications", PHI, 1997.

Reference Books:

1. Sanjit K. Mitra, "Digital Signal Processing, A Computer – Based approach", Tata Mc Graw-Hill, 1998
2. Lawrence R. Rabiner and Bernard Gold, "Theory and applications of digital signal processing", PHI
3. Chi-Tsong Chen, "Digital Signal Processing", , oxford university press.
4. Salivahnan, "Digital Signal processing", Tata Mc Graw –Hill.

LAB:

Note: At least ten experiments have to be performed during the semester. At least eight experiments should be performed from the list given below. Two experiments may either be performed from the given list or may be designed and set by the concerned faculty in consultation with H.O.D. as per the scope of the syllabus.

List of Experiments:

1. With the help of Fourier series, make a square wave from sine wave and cosine waves. Find out coefficient values
2. Evaluate 4 point DFT of and IDFT of $x(n) = 1, 0 \leq n \leq 3; 0$ elsewhere.
3. Implement the FIR Filters for 2 KHz cutoff frequency and 2 KHz bandwidth for band pass filter.
4. Design FIR filter using Fourier series expansion method.
5. Implement IIR low pass filter for a 4 KHz cutoff frequency and compare it the FIR filter with the same type use chirp as input signal.
6. Verify Blackman and Hamming windowing techniques for square wave as an input which window will give good results.
7. Implement the filter functions.
8. Generate DTMF sequence 1234567890*# and observe its spectrogram.
9. Generate an Amplitude Modulation having side low frequencies 1200 Hz and 800 Hz. Observe and verify the theoretical FFT characteristics with the observed ones.
10. Generate Frequency Modulation having carrier frequencies 1 KHz and modulating frequency 200 Hz with the modulation index of 0.7. Observe and verify the theoretical FFT characteristics with the observed ones.
11. Generate an FSK wave form for transmitting the digital data of the given bit sequence. Predict and verify the FFT for the same one.
12. To observe and verify the circular convolution

ECL 505	DIGITAL COMMUNICATION TECHNIQUES	L	T	P	Cr
		4	0	0	4

Objective: To understand the basic structures and fundamental principles of modern digital communication systems and to understand the concepts of information, entropy, channel capacity, modulation, source and channel coding. Also, use them to study communications and coding.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction

Source & Signal, basic signal processing, operation in digital communication, channel for digital communication, source coding theorem, Huffman coding, discrete memory less channels, mutual information, and channel capacity theorem.

UNIT 2: Detection & Estimation

Model of digital communication system, Gram Schmidt orthogonalization procedure, Detection of known signal in noise, probability of error , correlation receiver, matched filter receiver, Estimation; concept & criteria , maximum likelihood estimation, wiener filter Adaptive filter.

UNIT 3: Wave Form Coding Techniques

Pulse code modulation ,quantization , noise &signal to noise ratio, differential pulse code modulation , delta modulation , discrete PAM signal , intra symbol interference, eye pattern.

SECTION – B

UNIT 4: Digital Modulation Formats

Digital modulation format, coherent binary modulation techniques, quardature modulation techniques, Non coherent modulation techniques, M- ary modulation techniques.

UNIT 5: Error Control Coding

Types of codes, linear block codes, cycle codes, convolution codes, Maximum-likelihood decoding of convolution codes trellis codes.

UNIT 6: Data Network

Communication network, circuit switching Store and forward switching layered architecture Packet network, multiple access communication, spread spectrum modulation, direct sequence and frequency hoped spread spectrum modulation.

Text Books:

1. Simon Haykin, "Digital communications", John Wiley and sons, 1998.
2. B.P.Lathi, "Modern digital and analog communication systems", 3rd Edition, Oxford University press 1998.

Reference Books:

1. Wayne Tomasi, "Advanced Electronic Communications Systems", 6th Edition Pearson Education.
2. K. Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley and sons (Asia) Pvt Ltd.
3. R.N. Mutagi, "Digital Communication", Oxford University Press.
4. Lathi & Ding, "Modern Digital & Analog Communication", Oxford University Press.

ECL 507	DATA COMMUNICATION AND NETWORKS	L	T	P	Cr
		3	0	0	3

Objective: To provide a conceptual foundation for the study of data communications using the open systems interconnection (OSI) model for layered architecture and develop an understanding in basic hardware and software environments for data communications and computer networks.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Overview of Data Communication

Overview of Data Communications and Networking, Introduction, Network Models Physical Layer: Signals, Digital Transmission, Analog Transmission, Multiplexing, Transmission Media, Circuit Switching and Telephone

UNIT 2: Network & Data Link Layer

Network, Data Link Layer; Error Detection and Correction, Data Link Control and Protocol. Network Layer, Host-to-Host Delivery: Internetworking, Addressing and Routing, Network Layer Protocols: ARP, IPv4, ICMP, IPv6, and ICMPv6, Uncast and Multicast Routing: Routing Protocols

UNIT 4: Transport Layer

Transport Layer, Process-to-Process Delivery: UDP and TCP, Congestion Control and Quality of Service.

SECTION – B

UNIT 5: Application Layer

Application Layer, Client-Server Model: Socket Interface, Domain Name System (DNS), Electronic Mail (SMTP), and File Transfer (FTP), HTTP and WWW, multimedia.

UNIT 3: Local Area Networks

Point to Point Access: PPP, Multiple Access, Local Area Networks: Ethernet, Wireless LANs, Connecting LANs, Backbone Networks, Virtual LANS, Cellular Telephone and Satellite Networks, Virtual Circuit Switching.

UNIT 6: Security in Networking

Security: Cryptography, Message Security, User Authentication, and Key Management, Security Protocols in the Internet.

Text book:

1. B A Forouzan, “Data Communications and Networking”, TMH, 2003.

Reference books:

1. A S Tanenbaum, “Computer Networks”, PHI, 2004
2. W Stallings, “Data and Computer Communications”, PHI/Pearson
3. Comer, “Computer Network”, PHI, 2005
4. Sanjay Sharma, “Data Communication & Networks”, S.K. Kataria & Sons.

ECL 509	AGRI-ELECTRONICS	L	T	P	Cr
		3	0	0	3

Objective: To study the applications of electronics in the field of agriculture by using microcontroller through which various parameters can be measured & controlled.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Sensors & Transducers

Study of the Sensors related to the soil, plant, water, temperature, R.H., Radiation, P.H., EC, chlorophyl, Types & Classification of Transducers and study of Resistive, Inductive & Capacitive Transducers and their significance in Agri electronics

UNIT 2: Instrumentation and Computer Applications in Agri-Electronics

Electronic devices and their characteristics - rectifiers, amplifiers, oscillators, Applications of microprocessors and micro controller in data acquisition and control of agricultural engineering processes- measurements of soil moisture temperature irrigation water flow, pressure, and temperature , introduction of computers flow chart significance, programme translation and problem analysis in agriculture engineering.

UNIT 3: Process Control Systems

Introduction to DC Motors, Speed control of motor, coupling with valves & automatic control Valve Control Automation: Gate Valve, Solenoid valve, Automatic data processing system

SECTION – B

UNIT4: Quality Control

Water Quality Determination, Soil Quality Determination (PH ,nutrients, EC), Automatic Irrigation Control, Automation of different irrigation systems like Surface Irrigation, Drop Irrigation, Sprinkler irrigation Fertigation based on chlorophyl content of plant & Soil quality, Chemigation

UNIT5: Aerial Photography and Remote Sensing

Basic characteristics of photographic images, interpretation keys, equipment for interpretation, Remote sensing - merits and demerits of conventional and remote sensing approaches. Types of satellite images, fundamentals of satellite image interpretation, and techniques of visual and digital interpretations for soil, water and land use management.

UNIT 6: Telemetry & Control

Study of different components of Telemetry & Control with its significance in Agriculture, A case study on Weather Monitoring System, A Case Study on Milk Plant Control

Text Books:

1. J. H. Agarwal, Executive Course on "Agri-Electronics - a Tool for Agricultural Systems Management": Hyderabad, November 7 - 9, 1994 Centre for Advanced Studies in Emerging Technologies, Hyderabad, CASET
2. Kant Krishna, "Microprocessor Based Agri-Instrumentation"

Reference Books:

1. A. K. Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation".
2. Curits D.Johnson, "process control Instrumentation Technology.7/E";University of Houston,prentice Hall publication.
3. Joseph M.Juran,Frank M.Gryna ,"Juran's Quality Control Handbook",MC graw-Hill Publication.
4. David P.paine,james d.Kiser ,"Areial Photography and Image Interpretation",John willy publication.
5. Elsevier science, "Computer & Electronics in Agriculture comput electon Agra".

ECL 511	SPACE COMMUNICATION	L	T	P	Cr
		3	0	0	3

Objective:
To make the student acquaint of satellites system and its various communication services. and provide the complete knowledge of terrestrial systems, satellite orbits, space segment components, and satellite access methods.

THEORY:
Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction to Satellite Communication
Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

UNIT 2: Orbital Mechanism
Orbits and launching methods: Kepler's three laws of planetary motion, terms used for earth orbiting satellites, orbital elements, apogee and perigee heights, orbit perturbations, inclined orbits, local mean solar point and sun-synchronous orbits, standard time, Look Angle determination, Orbital perturbations

UNIT 3: Orbit control mechanism
Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification, introduction, receive-only home TV systems,

SECTION – B

UNIT 4: Interference
Noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example. Effects of rain, combined uplink and downlink C/N ratio, intermediation noise, inter-satellite links. Interference between satellite circuits.

UNIT 5: Global Positioning System(GPS)
Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

UNIT 6: VSAT
VSAT overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network. Introduction to (DBS) Television and radio:

Text Books:

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt, "Satellite Communications", WSE, Wiley Publications,2nd Edition,2003.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, "Satallite Communications Engineering", 2nd Edition, Pearson Publications 2003.

Reference Books:

1. M. Richharia, "Satellite Communications: Design Principles" BS Publications, 2nd Edition, 2003.
2. D.C Agarwal, "Satellite Communication" Khanna Publications, 5th Ed.
3. Manojit Mitra, "Satellite Communication" Eastern Economy Edition.
4. K.K.Sharma, "Satalite Communication" Katsons

ECL 513	SECURE COMMUNICATION	L	T	P	Cr
		3	0	0	3

Objective: In today's era when life is getting more and easier with the advancement of technologies, study of this Secure Communication subject will ensure to keep the students well acquainted with one of the most important technologies

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction to Ciphers

Codes and Ciphers, Statistical theory of cipher systems-Complexity theory of crypto systems 'Stream ciphers, Block ciphers.

UNIT 2: Stream Ciphers

Stream Ciphers- Rotor based system , shift register based systems, Design considerations for stream ciphers , Cryptanalsysis of stream ciphers, Combined encryption and encoding. Block Ciphers, DES and variant, modes of use of DES, Knacksack systems , RSK – Diffle Hellman Exchange – Authentication and Digital signatures, Elliptic curve based systems.

UNIT 3: Introduction to Encryption Techniques

Cryptology of speech signals, narrow band and wide band systems, Analogue & Digital Systems of speech encryption

SECTION – B

UNIT 4: Authentication Techniques

Security: Hash function Authentication: Protocols, Digital Signature standards. Electronics Mail Security,

UNIT 5: Data Compression Technique

PGP (Pretty Good Privacy) MIME, data Compression technique. IP Security, Architecture, Authentication Leader, Encapsulating security Payload, Key Management.

UNIT 6 : Web security:

Secure Socket Layer & Transport Layer security, secure electronic transactions, Firewalls Design principle, established systems.

Text Books:

1. Upper Saddle River, "Cryprotography and Network Security: Principal & Practices", 2nd Edition, PHI
2. Stalling, William, "SNMP", AWL

Reference Books:

1. SNMP, "A Guide to Network Management" MGH
2. H.H. Wang, "Telecom Network Management" MGH
3. U. Dlack, "Network Management" MGH.
4. Kadambri Agrawal, "Network Security & Management", S.K.Kataria & Sons

ECL 515	COMMUNICATION & INFORMATION THEORY	L	T	P	Cr
		3	0	0	3

Objective: The objective of this course is to understand the basic concepts of information theory which includes analysis, design, algorithm and optimization of communications systems. Student will also get exposure of various kinds of source and channel coding.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Elements of Information Theory

Information Sources, measurement of information and Entropy, Function marginal entropy, joint entropy, Conditional entropy and the Chain Rule for Entropy.

UNIT 2: Sampling and Source Coding

Sources coding theorem, Prefix, Variable and Fixed- length Codes. Error Correcting Codes. Sampling theorem, Type of sampling, Nyquist rate, Signal reconstruction.

UNIT 3: Channel Noise and Capacity

Perfect communication through a noisy channel. The binary symmetric channel and their Classification, capacity of a noiseless discrete channel. The Hartley and Shannon theorem for channel capacity.

SECTION – B

UNIT 4: Continuous Information and Coding Theorem

Extensions of the discrete entropies and measures to the continuous case. Noisy channel, Signal-to-noise ratio, power spectral density, Gaussian channels, Relative significance of bandwidth and noise limitations. The Shannon rate limit and efficiency for noisy continuous channels

UNIT 5: Error Control Coding

Linear blocks codes and their properties, hard-decision decoding, cyclic codes, Convolution codes, Soft-decision decoding, Viterbi decoding algorithm.

UNIT 6: Advanced Coding Techniques and Cryptography

BCH codes, Trellis codes, Trellis coded modulation, overview of encryption techniques, symmetric cryptography, DES, IDEA, asymmetric algorithms, RSA algorithm.

Text Books:

1. R Bose, "Information Theory, Coding and Cryptography", TMH 2007
2. Fred Halsall, "Multimedia Communications: Applications, Networks, Protocols and Standards", Perason Education Asia, 2002

Reference Books:

1. K Sayood, "Introduction to Data Compression" 3/e, Elsevier 2006
2. S Gravano, "Introduction to Error Control Codes", Oxford University Press 2007
3. Amitabha Bhattacharya, "Digital Communication", TMH 2006
4. Singh and Sapre, "Communication System", TMH

ECL 502	ELECTRONIC SYSTEM DESIGN	L	T	P	Cr
		4	0	2	5

Objective: The object of this course is to study the basic knowledge of digital electronic systems which also covers designing aspect of multi input digital system controllers.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Review of Digital electronics concept

Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR And AND OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.

UNIT 2: Sequential Machines

The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set /Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock F/F, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process,

UNIT 3: 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.

SECTION – B

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,

UNIT 5: 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.

UNIT 6: Synchronous 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, Electromagnetic Interference And Electromagnetic Compatibility Grounding And Shielding of Digital Circuits. Interfacing digital system with different media like fiber cable, co-axial cable etc.

Test Books:

1. Fletcher, "An Engineering Approach To Digital Design" PHI 1990

Reference Books:

2. "Designing With TTL Circuits" Texas Instruments.
3. A Anand Kumar, "Fundamentals of Digital Circuit", PHI.
4. Pratima Manhas, "Digital Logic & Design", S.K.Kataria & Sons.
5. Related IEEE/IEE publications

LAB:

Note: At least ten experiments have to be performed during the semester. At least eight experiments should be performed from the list given below. Two experiments may either be performed from the given list or may be designed and set by the concerned faculty in consultation with H.O.D. as per the scope of the syllabus.

List of Experiments:

1. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
2. To construct different types of flip-flops and verify their truth tables. Flip-flops like J-K flip-flops. S-R flipflop And D-flip-flops etc.
3. Implementation and verification of Decoder/De-multiplexer and Encoder using logic gates.
4. To see the working of a BCD-to-7 Segment decoder and to verify the truth table.
5. Design of Combinational Logic Circuits like Half-Adder, Full-Adder, Half- Subtractor and
   Full-Subtractor.
6. Verification of 4-Bit Magnitude Comparator.
7. Design of Decoders like BCD-Decimal decoder.
8. Design of Code Converters (Binary to Gray)
9. Design of Shift register (To verify Serial to Parallel, Parallel to Serial ,Serial to Serial and
   Parallel to Parallel Converters) using Flip-Flops
10. Design of Ring & Johnson Counters using Flip-Flops
11. Design of Binary/Decade Counter
12. Design Asynchronous Counter, Mod Counter, Up Counter, Down Counter and Up/Down Counter
13. Design Synchronous Counter, Mod Counter, Up Counter, Down Counter and Up/Down Counter
14. Study of Arithmetic Logic Unit(ALU) using IC 74181.
15. Study of RAM.

ECL 504	ADVANCED OPTICAL COMMUNICATION	L	T	P	Cr
		4	0	2	5

Objective: The objective of this course is to study and analysis of optical communication systems which includes, in particular, transmission effects, advanced transmission techniques and coherent modulation formats.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Fundamentals of Optical Fibers:

Review of fundamentals, ray theory transmission, skew rays, calculation of refractive index , numerical aperture, Noise sources, channel impairments, and optical transmission system design, Advanced modulation formats, OFDM, polarization multiplexing, constrained coding, and coherent detection: Multilevel modulation schemes.

UNIT 2: Multiplexing

Orthogonal frequency-division multiplexing (OFDM), Polarization multiplexing, Constrained (line or modulation) coding, and Coherent detection. Parametric processes and applications, Parametric amplifiers, All-optical regeneration, Wavelength conversion, and Multibanded switching.

UNIT 3: Dispersion in Optical Fiber

Signal distortion and attenuation, Intermodal and intramodal dispersion, dispersion flattened and dispersion compensated fibers, Profile dispersion,study of PMD. Advanced chromatic dispersion compensation:Signal pre-distortion compensation,

SECTION – B

UNIT 4: Sources & Detectors

Laser diode and photodiode, Photodetector noise analysis, Analog and Digital communication link design. Double Heterojunction structure, semiconductor LASER diode. Photodetector noise analysis, Analog and Digital communication link design.

UNIT 5: Optical Devices

WDM, DWDM, optical couplers, optical filters, tunable sources and tunable filters, arrayed waveguide grating, Mach-Zehnder interferometer multiplexer, optical add/drop multiplexers, isolators, circulators, optical filters, tunable sources and tunable filters, arrayed waveguide grating, diffraction grating, optical integrated circuits .Characterization of optical fibers, OTDR.

UNIT 6: Optical Sensors

WDM networks, Classification of optical sensors. Intensity modulated, phase modulated and spectrally modulated sensors. Spatial-Domain-Based Multiplexing and Modulation, Advanced PMD compensation: Optical compensation techniques, Electrical compensation techniques (FFE, DFE, VE, TE), and OFDM based techniques in PMD compensation. Optical switching, WDM networks, Classification of optical sensors.Intensity modulated, phase modulated and spectrally modulated sensors.

Text Books:

1. B Djordjevic, W. Ryan, B. Vasic, "Coding for Optical Channels", Springer, 2010.
2. Advanced Optical Wireless Communication Systems
3. Edited by: Shlomi Arnon, Ben Gurion University of the Negev, Israel
4. Edited by: John Barry, Georgia Institute of Technology
5. Edited by: George Karagiannidis, Aristotle University, Thessaloniki
6. Edited by: Robert Schober, University of British Columbia, Vancouver
7. Edited by: Murat Uysal, Özyeğin University, Istanbul Artech House, May 2012

Reference Books:

1. Leonid G. Kazovsky, Sergio Benedetto, Alan E. Willner, "Optical fiber communication systems", Cambridge university press 1996
2. Matthew N. O. Sadiku, "Optical and Wireless Communications: Next Generation Networks", CRC Press 2002.
3. John . M. Senior, "Optical fiber communication" 2nd edition, Pearson Education.
4. Gerd Keiser, "Optical fiber communication" Tata Mc-Graw Hill.

LAB:

Note: At least ten experiments have to be performed during the semester. At least eight experiments should be performed from the list given below. Two experiments may either be performed from the given list or may be designed and set by the concerned faculty in consultation with H.O.D. as per the scope of the syllabus.

List of Experiments:

1. To draw the characteristic of E-O converter using LED and LASER.
2. To set up the fiber optic analog and digital link
3. To measure the Numerical Aperture of given optical fiber using LED and LASER.
4. To observe and verify the intensity Modulation technique using analog and digital input signals
5. To observe and verify the optical fiber frequency modulation, pulse width modulation and demodulation system
6. To observe the bending loss and propagation loss in optical fiber using CRO and optical fiber power meter
7. Setting of fiber optic voice link
8. To form a PC to PC communication link using optical fiber and RS-232. And determine the sensitivity of fiber optic link
9. To determine bit rate supported by the fiber optic link
10. To prepare the power budget for fiber optic link.
11. To observe the switched fault in:
    a. Intensity Modulation
    b. Frequency Modulation
    c. Pulse width Modulation
12. To measurement the beam width and draw the radiation pattern of LED.

ECL 506	TELECOMMUNICATION SWITCHING SYSTEMS	L	T	P	Cr
		4	0	0	4

Objective: To learn Switching, Signaling and traffic in the context of telecommunication network. Expose through the evolution of switching systems from manual and electromechanical systems to stored-program-controlled digital systems.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Switching

Switching Functions, Space Division Switching, Time Division Switching, two-dimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross-Connect Systems, Digital Switching in an Analog Environment. Elements of SSN07 signaling.

UNIT 2: Network Control

Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips.

UNIT 3: Synchronization & Management

Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control & Management

SECTION – B

UNIT 4 : Digital Subscriber Access ISDN

ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL.

UNIT 5 : Digital Loop Carrier Systems

Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

UNIT 6 : Traffic Characterization:

Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

Text Book:

1. Viswanathan. T., "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.

Reference Books:

2. Bellamy John, "Digital Telephony", John Wily & Sons, Inc. 3rd edn. 2000.
3. V.S.Bagad, "Telecommunication Switching System & Networks" Tata McGraw Hill.
4. Gnanasivam, "Telecommunication Switching & Networks" 2nd Edition New Age ublication.
5. Flood, "Telecommunication Switching, Traffic and Networks" Pearson Education, India

ECL 508	WIRELESS AND MOBILE COMMUNICATION	L	T	P	Cr
		4	0	0	4

Objective: Describe the characteristics and operation of contemporary wireless network technologies, Bluetooth, wireless personal area network etc. and understand the importance of TCP/IP protocol suite in a mobile environment including the operation of Mobile IP and a mobile ad-hoc routing protocol.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Fundamentals of Wireless Communication

Systems and Design Fundamentals, Propagation Models, Description of cellular system, Frequency Reuse, Co-channel and Adjacent channel interference, desired C/I from a normal case in an omni directional antenna system, cell splitting, consideration of the components of cellular systems. co-channel measurement design of antenna system, antenna parameter and their effects.

UNIT 2: Propagation Models for Wireless Networks

Multipath Effects in Mobile Communication, Models for Multipath Reception, Modulation methods and coding for error detection and correction, modulation methods in cellular wireless systems. Wireless Local Area Networks (WLANs), Cellular –WLAN Integration, All-IP Network: Vision for 4G ,GSM: Architecture and Protocols , The General Packet Radio Services, Overview of CDMA systems.

UNIT 3: Introdution to UMTS

UMTS Network Architecture, UMTS Interfaces, UMTS FDD and TDD, UMTS Channels, Logical Channels, UMTS downlink transport and physical channels, UMTS uplink transport and physical channels UMTS Time Slots, Mobility Management for UMTS Network

SECTION – B

UNIT 4: Internet Protocol

Basic Mobile IP, Mobile IP Type-MIPV4 and MIPv6, Mobile IP: Concept, Four basic entities for MIPv4, Mobile IPv4 Operations, Registration, Tunneling, MIPv4 Reverse Tunneling, MIPv4 Triangular Routing, Problems and Limitations of MIP, MIPv4 Route Optimization

UNIT 5: Role of IP on Wireless Networks

IP for GPRS and UMTS R99, Protocol Reference Model for UMTS PS domain, Packet-Switched Domain Protocol Stacks: Role of Interfaces, The GTP Tunnel, Mobility Management in Wireless Networks, Mobility Classification, Seamless Terminal Mobility Management, Limitations of current TCP/IP networks for mobility support, Mobility

solution, Transparent Access, Use of Mobile IP for Non-transparent access, Dynamically accesses IP address from External Network

UNIT 6: Heterogeneous Network Architecture

Benefits of Integration, Internetworking Network Architecture: Point of Integration, IEEE 802.11 Overview, Integration Architecture: Tight Coupling Integration, Loose Coupling Integration, Handoff in integrated network architecture, introduction to Mobile Ad-hoc Networks

Text Books:

1. Theodore S rappaport, "Wireless communication principles and practice", 2nd Ed, Pearson Education.
2. William, C Y Lee, "Mobile Cellular Telecommunications" 2nd ed.; McGraw Hill

Reference Books:

1. Mobile Communication Hand Book; 2nd Ed.; IEEE Press
2. Lawrence Harte, "3G wireless Demystified", Mc. Graw Hill pub.
3. Kaveh Pahlavan and Prashant Krishnamurthy, "Principles of Wireless Networks", PHI.
4. Mischa Schwartz, "Mobile wireless communications" Cambridge University press, UK, 2005
5. Blake, "Wireless communication theory", Thomson Delmar 2004

ECL 512	VLSI-I	L	T	P	Cr
		3	0	0	3

Objective: to provide a comprehensive and state of the art knowledge in the area of VLSI Design. The technical knowledge pertaining to VLSI will help the participant in understanding the functioning of the system. This will further help in providing the necessary expertise required by the industry.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction to CMOS Circuits

MOS transistors, MOS switches, CMOS logic: Inverter, combinational logic, NAND, NOR gates, compound gates, Multiplexers. Memory: Latches and registers. Circuit and system representations: Behavioral, structural and physical representations.

UNIT 2: MOS Transistor Theory

NMOS, PMOS enhancement mode transistors, Threshold voltage, body effect, MOS device design equations, MOS models, small signal AC characteristics, CMOS inverter DC characteristics, static load.

UNIT 3: MOS Inverters, Bipolar Devices

Advanced MOS modeling – large signal and small signal modeling for BJT.

SECTION – B

UNIT 4: Analog VLSI

Introduction to analog VLSI, Advanced MOS modeling, BJT modeling, CS, CD and CG amplifiers, Current mirrors-active loads, high input impedance current mirrors, BJT gain stages, CMOS operational amplifiers-compensation, comparators, sample and hold circuits. LOW – VOLTAGE LOW POWER VLSI CMOS CIRCUIT DESIGN CMOS invertor – Characteristics – Power dissipation. Capacitance estimation. CMOS static logic design, Logic styles.

UNIT 5: Circuit Characterization and Performance Estimation

Estimation of resistance, capacitance, inductance. Switching characteristics, CMOS gate transistor sizing, power dissipation, sizing routing conductors, charge sharing, Design margining yield, reliability. Scaling of MOS transistor dimensions.

UNIT 6: CMOS Circuit And Logic Design

CMOS logic gate design, physical design of simple logic gates. CMOS logic structures. Clocking strategies, I/O Structures.

Text Books:

1. Weste, Eshraghian, "Principles of CMOS VLSI design", 2nd Edition Addison Wesley, 1994.
2. Douglas A Pucknell and Kamaran Eshragian, "Basic VLSI design", 3rd edition, PHI, 1994.

Reference Books:

3. Bellaour & M.I. Elamstry, "Low – Power Digital VLSI Design, Circuits and Systems", Kluwer Academic Publishers, 1996.
4. S. Imam & M. Pedram, "Logic synthesis for Low – Power VLSI Designs", Kluwer Academic publishers, 1998.
5. B.G.K. Yeap, "Practical Low Power Digital VLSI Design", Kluwer Academic publishers, 1998.
6. S.M Sze, "VLSI Technology", Tata Mc Graw Hill

ECL 514	NANO TECHNOLOGY - I	L	T	P	Cr
		3	0	0	3

Objective: Impart the basic knowledge on Nanoscience and Technology. Understand the various process techniques available for the processing of Nanostructured materials. Impart knowledge on the exotic properties of nano structured materials at their nano scale lengths.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction To Nanotechnology

Nanotechnology application,uses and abuse of nanotechnology, fullerene, CNT & their types Nanoscale technology: Consequences of the nanoscale for technology and society. Beyond Moore's Law Molecular building blocks for nanostructure systems, Nano-scale 1D to 3D structures Energy Band Diagram: Energy level diagram, Fermi function, n-type operation, p-type operation, Rate equations for a one-level model, Quantum capacitance, Negative Differential Resistance (NDR).

UNIT 2: Advanced Characterization Techniques

SEM (scanning electron microscopy), TEM (transmission electron microscopy),Scanning Probe microscopy(SPM), Atomic force microscopy(AFM), HRTEM, Secondary ion mass (SIMS) spectrometry , X- ray diffraction (XRD), Raman spectroscopy

UNIT 3: Energy Band and Nano Structure

Electronic states in crystal energy bands, Concepts of 2D nanostructures (quantum wells), 1D nanostructures (quantum wires) 1D nanostructures (quantum dots), artificial atomic clusters.

SECTION – B

UNIT 4: Size Dependent Property and Electron Transport in Semiconductor

Size dependent properties, Size dependent absorption spectra,Blue shift with smaller sizes, Phonons in nanostructures,Contacts at Nano level, AFM. STM tip on a surface, Electron charge and spin transport in organic and semiconductor nanodevice.GMR

UNIT 5: Coulomb Blocked and Quantum Phenomena

Charging of quantum dots, Coulomb blockade, Quantum mechanical treatment of quantum wells, wires and dots, Widening of band gap in quantum dots, Strong and weak confinement, Properties of coupled quantum dots,

UNIT 6: Nano Systems

Synthesis and chacterization Methods of Synthesis: Molecular beam epitaxy, MOCVD, chemical routes, nanoparticles on polymers, pulsed laser deposition, ion beam assisted techniques including embedded nanoparticles, RF sputtering.

Text books:

1. Dr. W.R.Fahrner, "Nanotechnology and Nanoelectronics Materials, Devices, Measurement Techniques", Springer, 2005.
2. Chris Binns, "Introduction to Nanoscience and NanoTechnology", John Wiley and Sons. 2010.

Reference Books:

3. Mark A. Reed and Takhee Lee, "Molecular Nano electronics", American Scientific Publishers, 2003.
4. K.Bamam and D.Vvedensky, "Low Dimensional Semiconductor Structures", Cambrige University Book, 2001.
5. Jeremy Ramsden, " Essentials of nanotechnology",Ventus Publishing
6. Davis & mott, "Electronic process in Non-Crystalline Materials"

ECL 516	MICROWAVE ENGINEERING-I	L	T	P	Cr
		3	0	0	3

Objective: The goal of this course is to introduce the concepts and principles of the advanced microwave engineering, Design of passive and active microwave components and microwave circuits using microstrip , guided wave device, amplifier, oscillators etc.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction to Microwave

Review of Maxwell's equations(Ampere's law, Faraday's law, Gauss's law), microwave region and band designation,Helmohltz's equations.Effects on velocity and wavelength in a medium other than free space.

UNIT 2: Transmission Lines

Transmission line parameters, Propagation of Waves on Transmission Lines, 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 Transmission Line, Stub Matching, Binomial Matching, Line Connections, The Parallel-Plate Line, The Coaxial Line, The strip transmission Line.

SECTION – B

UNIT 4: Elementary Theory of Wave guides

Types of waveguides, Propagation of waves in Rectangular waveguide as well as Circular waveguide, Power losses in a waveguide, TM/TE modes in rectangular waveguide.

UNIT 5: Microwave Components

Waveguide microwave junctions, Scattering Matrix, S-parameters, Microwave T-junctions: H-plane Tee junction-plane Tee junction, hybrid Tee junction, Directional couplers: Two hole directional coupler, Bethe or single hole coupler, Scattering matrix of a directional coupler, Phase shifter.

UNIT 6: Solid State Microwave Devices

Gunn oscillators, IMPATT diodes, TRAPATT diodes, BARITT diodes, Transited oscillators, Oscillator circuit,Klystrons, Measurement of Power, Measurement of voltage standing wave ratio, Measurement of Impedance.

Text Books:

1. Microwave devices and circuits: Samuel Liao, Phi
2. Microwave devices & Radar Engg: M.Kulkarni, Umesh

Reference Books:

3. Microwaves and Radar : A.K. Maini; Khanna

ECL 518	EMBEDDED SYSTEM DESIGN-I	L	T	P	Cr
		3	0	0	3

Objective: To develop the next generation of technologies, methods and tools for modeling, designing and its implementation for operational hardware/software embedded systems with optimal performance, high confidence, reduced time.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction to Embedded Hardware and Software

Terminology – Gates – Timing diagram – Memory – Microprocessor buses – Direct memory access – Interrupts – Built interrupts – Interrupts basis – Shared data problems – Interrupt latency - Embedded system evolution trends – Interrupt routines in an RTOS environment.

UNIT 2: System Modeling With Hardware/Software Partitioning

Embedded systems, Hardware/Software Co-Design, Co-Design for System Specification and modeling- Single-processor Architectures & Multi-Processor Architectures, comparison of Co-Design Approaches, Models of Computation, Requirements for Embedded System Specification, Hardware/Software Partitioning Problem, Hardware/Software Cost Estimation, Generation of Partitioning by Graphical modeling, Formulation of the HW/SW scheduling, Optimization .

UNIT 3: Hardware/Software Co-Synthesis

The Co-Synthesis Problem, State-Transition Graph, Refinement and Controller Generation, Distributed System Co-Synthesis.

SECTION – B

UNIT 4: Pic Micro-Controller and Interfacing

Introduction, CPU architecture, registers, instruction sets addressing modes loop timing, timers interrupts, interrupts, timing I/o expansion, I 2 C bus operation serial EPROM, analog to digital converter, UART-Baud Rate-Data Handling-initialization, special features- serial programming a“ parallel slave port.

UNIT 5: Memory and Interfacing

Memory, Memory write ability and storage performance – Memory types – composing memory – Advance RAM interfacing communication basic – Microprocessor interfacing I/O addressing – Interrupts – Direct memory access – Arbitration multilevel bus architecture – Serial protocol – Parallel protocols – Wireless protocols – Digital camera example .

UNIT 6: Real Time Operating Systems

Task and Task States, tasks and data, semaphores and shared Data Operating system services-message questimer function- events - memory management, interrupt routines in an RTOS environment, basic design using RTOS.

Text Books:

1. David. E. Simon, "An Embedded Software Primer", Pearson Education, 2001.
2. Tammy Noer gaard, "Embedded System Architecture, A comprehensive Guide for Engineers and Programmers", Elsevier, 2006.

Reference Books:

3. Raj Kamal, "Embedded Systems- Architecture, Programming and Design", Tata McGraw Hill, 2006.
4. Frank Vahid and Tony Givargis, "Embedded Systems Design: A Unified Hardware/Software Introduction", John & Wiley Publications, 2002.
5. Steve Heath, "Embedded System Design", Elsevier, Second Edition, 2004.
6. Jorgen Staunstrup, Wayne Wolf, "Hardware/Software Co-Design: Principles and Practice", Kluwer Academic Pub, 1997.
7. Giovanni De Micheli, Rolf Ernst Morgon, "Reading in Hardware/Software Co-Design" Kaufmann Publishers, 2001.

ECL 517	ARTIFICIAL NEURAL NETWORKS & FUZZY LOGIC	L	T	P	Cr
		4	0	2	5

Objective: To develop the next generation of technologies, methods and tools for modeling, designing and its implementation for operational hardware/software embedded systems with optimal performance, high confidence and reduced time.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction

Neural networks characteristics, History of development in neural networks principles, Artificial neural net terminology, Model of a neuron, Topology, Objective of Neural networks, pattern recognition. Basic concepts. Basic network properties. Classification of neural networks.

UNIT 2: Learning Methods & Neural Network Models

Network structure, Types of learning-supervised and unsupervised learning, Re-inforcement learning, Knowledge representation and acquisition. Neural Models: McCulloch and Pitts Neuron, Perceptron, Basic Hop field model, Basic learning laws, K-means clustering algorithm, Kohonen`s feature maps.

UNIT 3: Artificial Neural Networks

Radial basis function neural networks, Basic learning laws in RBF nets, Recurrent back propagation, Introduction to counter propagation networks, CMAC network, and ART networks, Unsupervised learning-Clustering, Kohonen network and competitive learning, Backpropagation Network, BPN applications.

SECTION – B

UNIT 4: Applications of Neural Networks

Pattern recognition, Pattern mapping, Optimization, Associative memories, speech and decision making. VLSI implementation of neural networks.

UNIT 5: Basic Concepts of Fuzzy Logic

Fuzzy vs. Crisp set, Linguistic variables, logic operators, Membership functions, Fuzzy sets & Operations of fuzzy sets, properties of fuzzy sets, Relational inference, Fuzzy IF- THEN rules, Variable inference techniques, Fuzzy system design, Antilock Breaking system (ABS), Industrial applications.

UNIT 6: Fuzzy Logic Controller (FLC)

Types, Fuzzification, Defuzzification, fuzzy inference algorithm, Overall algorithm, Input data processing. Evaluating antecedent fuzzy variables. Automatic ECG analyzer, Output processing. Hardware implementation of fuzzy controller.

Text Books:

8. Yegnanarayana, "Artificial Neural Networks" PHI
9. ROSS J.T , "Fuzzy logic with engineering application", TMH

Reference Books:

3. J.M. Zurada, "Introduction to artificial neural systems", Jaico Pub.
4.Simon Haykin, "Neural Networks", PHI
5.Ahmad M.Ibrahim, "Introduction to applied Fuzzy Electronics", PHI
6.P.D. wasserman , "Neural computing theory & practice",(ANZA PUB).

LAB:

Note: At least ten experiments are to be performed during the semester. At least eight experiments should be performed from the list of experiments. Two experiments may either be performed from the given list of experiments or may be designed by the concern faculty in consultation with H.O.D as per the scope of syllabus.

List of Experiments:

1. Introduction to the Neural Network Toolbox in MATLAB.
2. Study and simulation of Model of a neuron on MATLAB.
3. Simulation of different topologies of Neural Networks on MATLAB .
4. Training of neural networks on MATLAB
5. Study of Different types of Membership Functions.
6. Introduction to Fuzzy Logic Toolbox in MATLAB
7. Designing of Fuzzy Logic Based Fan Speed Controller
8. Designing of Fuzzy Logic Based Cruise Controller.
9. Designing of Fuzzy Logic Based Hot Water Heater Controller.
10. Designing of Fuzzy Logic Based Washing Machine Controller.
11. Designing of a Fuzzy Logic Based Liquid Level Controller.

ECL 519	CDMA TECHNOLOGY	L	T	P	Cr
		4	0	0	4

Objective: The Objective of this course is to impart students the knowledge of currents trends being used in the field of tele-communication systems now a days.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Spread Spectrum & CDMA

Motivation- Direct sequence spread spectrum- Frequency Hopping systems, Time Hopping., Anti-jamming- Pseudo Random (PN) sequence, Maximal length sequences, Gold sequences, and Generation of PN sequences.

UNIT 2: Diversity in DS-SS Systems:

Rake Receiver- Performance analysis. Spread Spectrum Multiple Access, CDMA Systems- Interference Analysis for Broadcast and Multiple Access Channels, Capacity of cellular CDMA networks- Reverse link power control, hard and soft hand off strategies.

UNIT 3: OFDMA and MC-CDMA

Frequency hopping in OFDMA - OFDMA system description – Channel coding, modulation, time and frequency synchronization, Combination of OFDM and CDMA - MC-CDMA, MT-CDMA and MC-DS CDMA systems - Difference between OFDMA and MC-CDMA

SECTION – B

UNIT 4: Cellular Wireless Communication Standards

GSM specifications and Air Interface, specifications, IS 95 CDMA- 3G systems: UMTS & CDMA 2000 standards and specifications.

UNIT 5: Fading Channel Capacity of Wireless Channels

Capacity of flat and frequency selective fading channels, Multiple Input Multiple output (MIMO) systems- Narrow band multiple antenna system model, Parallel Decomposition of MIMO Channels- Capacity of MIMO Channels.

UNIT 6: CDMA Spatial Processors

Non-coherent & coherent CDMA spatial processors, spatial processing rake receiver, Multi-user spatial processing, dynamic resectoring, downlink beam forming for CDMA.

Text Books:

1. Samuel C Yang, “CDMA RF System Engineering,” Artech House, 2008.
2. Richard Van Nee and Ramjee Prasad, “OFDM for Wireless Multimedia Communication,” Artech House, 2007.

Reference Books:

3. LajasHanzo, “OFDM and MC-CDMA for Broadband Multiuser Communications,” 2003.
4. Khaled Fazal and Stephen Kaiser, “Multicarrier and Spread Spectrum Systems,” 2008

ECL 527	VLSI-II	L	T	P	Cr
		3	0	0	3

Objective: The objective of this course is to develop the deep understanding of the design of chip so as to get the optimum functionality in terms of area, power consumption and speed.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: VLSI Automation Algorithms Partitioning

Problem formulation, classification of partitioning algorithms, Group migration algorithms, simulated annealing & evolution, other partitioning algorithms.

UNIT 2: Placement, Floor Planning & Pin Assignment

Problem formulation, simulation base placement algorithms, other placement algorithms, constraint based floor planning, floor planning algorithms for mixed block & cell design. General & channel pin assignment.

UNIT 3: Global Routing

Problem formulation, classification of global routing algorithms, Maze routing algorithm, line probe algorithm, Steiner Tree based algorithms, Detailed routing: problem formulation, classification of routing algorithms, single layer routing algorithms, two layer channel routing algorithms, three layer channel routing algorithms, and switchbox routing algorithms.

SECTION – B

UNIT 4: The Need of Testing

The problem of Digital and Analog Testing, Design for Test, Software Testing, Faults in Digital Circuits, Faults models- stuck at faults, Bridging faults,intermittent faults.

UNIT 5: Digital test pattern Generation

Test pattern generation for combinational logic circuits,Manual test pattern generation, Automatic test pattern generation- Roth's D Algorithm, pseudorandom test pattern generation, Exhaustive and non- Exhaustive test pattern generation,Delay fault testing.

UNIT 6: Testability Techniques:

Partioning and Ad- hoc methods and Scan-path testing,Boundary Scan and IEEE standard 1149.1,Online Self Test and Offline built in Self-Test(BIST),Testing of Digital circuits-A/D converters, PLD's .

Text Books:

1. Naveed Sherwani, "Algorithm for VLSI physical design and Automation", Kluwer Academic Publisher,Second Edition.

Reference Books:

2. Stanley L. Hurst, "VLSI TESTING: digital and mixed digital techniques", Pub:Inspec/IEE, 1999

ECL 529	NANO TECHNOLOGY – II	L	T	P	Cr
		3	0	0	3

Objective: Under this syllabus, the advance semiconductor nanoparticle and their size dependent properties,Nanodevices,MEMS & NEMS system,silicon technology and thin film processing technique and vacuum technique will be covered.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Semiconductor Nano Particles & Their Size Dependent Properties

Semiconductor nano particles: size–dependant physical properties, Melting point, solidstate phase transformations, excitons, band-gap variations-quantum confinement, effect of strain on band-gap in epitaxial quantum dots. The p-n junction and the bipolar transistor; metal semiconductor and metal-insulator, Semiconductor junctions; field-effect transistors, MOSFETs, CMOS: heterostructures, high-electron-mobility devices, HEMTs, Quantum Hall effect, Introduction to single electron transistors (SETs): quantum dots, single electron effects, Coulomb
blockade.

UNIT 2: Nanophotonic Devices

Resonant cavity quantum well lasers and light-emitting diodes, , Fundamentals of Cavity QED, strong and weak coupling regime, Purcell factor,Spontaneous emission control, Application of microcavities, including low threshold lasers, resonant cavity LED. Microcavity-based single photon sources.

UNIT 3: Micro Electro Mechanical Systems (MEMS)

Silicon micromachining – bulk micromachining – surface micromachining – Microsystems fabrication techniques – photolithography – ion implantation – diffusion – oxidation – CVD – PVD – sputtering – single crystal reactive etching – LIGA – x-ray based fabrication – packaging of MEMS devices – three level microsystem packaging – device level packaging – system level packaging – interface in microsystem packaging – packaging technology – sealing – 3D packaging – assembly of microsystem - selection of packaging materials.

SECTION – B

UNIT 4: Nano Electromechanical Systems (NEMS)

Introduction – nano machining of NEMS based upon electron beam lithography – Nano electromechanical systems fabrication – nano imprint lithography – polymeric nano fiber templates – focused ion beam doping wet chemical etching – stencil lithography and sacrificial etching – large scale integration – future challenges - applications.

UNIT 5: Potential of Silicon Technology

Development of microelectronics – nanostructure region – complexity problem – challenges in nanoelctronics - Semiconductor as based materials – band diagram of semiconductor – inhomogeneous semiconductor band diagram - different types of transistor integration -

microminiaturization process - methods and limits- scaling – milestone of silicon technology – limits - microelectronic and mechanical systems (MEMS) – micromechanics technology – micromechanics for nanoelctronics – integrated optoelectronics.

UNIT 6: Vacuum & Processing Technology

Vaccume technology: Concept of different vacuum pumps; rotary, diffusion, turbo molecular
pump, cryogenic pump, ti-sublimation pump, gas kinetics; concept of different gauges : pirani, penning, pressure control.
Processing technology: Pattern transfer: reactive ion etching, ion milling, ion beam dry itching, Molecular beam epitaxy. Applications: Thin Film Photo voltaic cells, Thin film Batteries.

Text Books:

1. K. Goser, P. Glosekotter and J. Dienstuhl, "Nanoelectronics and Nanosystems – From Transistors to Molecular Quantum Devices" Springer, 2004.
2. Mohamed Gad-el-Hak, "The MEMS Handbook", CRC Press, 2002.

Reference Books:

3. Delchar T.A., "Vaccum Physics and Techniques", Chapman and hall, 1993.
4. Chang C.Y. and Sze S.M., "VLSI tehnology" Tata McGraw-Hill,1996.
5. W.R.Fahrner, "Nanotechnology and Nanoelectronics – Materials, Devices, Measurement Techniques",Springer, 2006.
6. Karl Goser, Peter Glosekotter, Jan Dienstuhl., "Nanoelectronics and Nanosystems" Springer, 2004.
7. Bharat Bhusan, "Handbook of Nanotechnology" Springer

ECL 531	MICROWAVE ENGINEERING-II	L	T	P	Cr
		3	0	0	3

Objective: The goal of this course is to introduce the concepts and principles of the advanced microwave engineering, Design of passive and active microwave components and microwave circuits using microstrip, guided wave device, filter, amplifier, oscillators etc.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Introduction

Microwave Frequencies, Microwave Devices, Microwave Systems, TEM wave, TE wave, TM wave, HE wave, Microwave Hybrid Circuits, review of wave equation for TE and TM wave.

UNIT2: Advanced Microwave Components

Waveguide Tees, Magic Tees (Hybrid Trees), Hybrid Rings (Rat-Race Circuits), Directional Couplers, Two-Hole Directional Couplers, S Matrix of a Directional Coupler, Hybrid Couplers, Microwave Circulators, Microwave Isolators.

UNIT 3: Waveguide

Definition of waveguide, types of waveguide, propagation of waves in rectangular waveguide and circular waveguide, cutoff wavelength in rectangular waveguide and circular waveguide, dominant and degenerate modes for rectangular and circular waveguide.

SECTION – B

UNIT 4: Cavity Resonators

Quality factor of a rectangular cavity resonator and circular cavity resonator, expression for f0 in rectangular and circular cavity resonator, field expression for TMnmp and TEnmp modes in a rectangular and circular cavity resonator.

UNIT 5: Microwave Measurements

Measurement devices and instrumentation, frequency measurement, power measurement, measurement of voltage standing wave ratio, measurement of impedance.

UNIT 6: Microwave Tubes and its Operation

Two cavity klystron amplifier, multicavity klystron, reflex klystron, travelling wave tube (TWT), backward wave oscillator (BWO), magnetron.

Text Books:

1. Samuel Liao, “Microwave devices and circuits”, PHI
2. M .Kulkarni, “Microwave devices & Radar Engg”, Umesh S.

Reference Books:

3. R.E. Collin, “Foundations for Microwave Engg.” IEEE Press Second Edition. 2002.
4. David M.Pozar, “Microwave Engg.” John Wiley & Sons - 2nd Edition, 2003.
5 . P. A. Rizzi, “Microwave Engg. (Passive ckts)”, PH1

ECL 533	EMBEDDED SYSTEM DESIGN-II	L	T	P	Cr
		3	0	0	3

Objective: To develop the next generation of technologies, methods and tools for modeling, designing and its implementation for operational hardware/software embedded systems with optimal performance, high confidence, reduced time.

THEORY:

Note: Question No 1 is compulsory and will be of short answer type from entire syllabus. Two questions are to be attempted out of three questions from each Section A & B.

SECTION – A

UNIT 1: Basics of embedded system design

Embedded systems, processor embedded into a system, embedded hardware units and devices in a system, embedded software in a system, examples of embedded systems, embedded system-on-chip and use of VLSI circuit design technology, complex systems design and processors, design process in embedded system, formalization of system design, design process and design examples, classification of embedded systems, skills required for an embedded system designer.

UNIT 2: Device Drivers and Interrupts Service Mechanism

Programmed-I/O Busy-Wait approach without Interrupt Service Mechanism, ISR concept, Interrupt Sources, Interrupt servicing (Handling) mechanism, multiple Interrupts, context and the periods for context switching, Interrupt latency and deadline, classification of processors Interrupt Service Mechanism from Context-Saving Angle.

UNIT 3: Basic Design Using a Real – Time Operating System

Overview, Encapsulating Semaphores and Queues, Hard real time scheduling considerations, saving memory space, saving power.

SECTION – B

UNIT 4: Embedded Software Development Tools

Host and Target Machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System.

UNIT 5: Design Examples and Case studies of Program Modeling and Programming With RTOS-1

Case study of Embedded System Design and Coding for an Automatic Chocolate vending Machine (ACVM) using Mucos RTOS, Embedded systems in Automobile, Case study of an embedded system for an Adaptive Cruise Control (ACC) system in a Car.

UNIT 6: Embedded Based Control Systems

Introduction, Open-loop and Closed-loop Control Systems overview, General Control Systems and PID Controllers, Control Objectives, Modeling Real Physical Systems, Controller Design, PID Tuning, Practical Issues Related to Computer-Based Control Quantization and overflow Effects, Aliasing, Computation Delay, Benefits of Computer-

Based Control Implementations, Repeatability, Reproducibility, and Stability, Programmability.

Text Books:

1. Raj Kamal, "Embedded Systems- Architecture, Programming and Design", Tata McGraw Hill, 2006.
2. David. E. Simon, "An Embedded Software Primer", Pearson Education, 2001.

Reference Books:

3. Frank Vahid and Tony Givargis, "Embedded Systems Design: A Unified Hardware/Software Introduction", John & Wiley Publications, 2002.
4. Steve Heath, "Embedded System Design", Elsevier, Second Edition, 2004.
5. Ralf Niemann, "Hardware/Software Co-Design for Data Flow Dominated Embedded Systems", Kluwer Academic Pub, 1998.
6. Tammy Noer gaard, "Embedded System Architecture, A comprehensive Guide for Engineers and Programmers", Elsevier, 2006.

ECC 521	SEMINAR	L	T	P	Cr
		0	0	2	1

Objective: The objective of the seminar is to prepare the student for a systematic and independent study of the recent topics in the advanced fields of Communication Engineering and related topics.

Seminar topics may be chosen by the students with advice from the faculty members. Students are to be exposed to the following aspects for a seminar presentation.

- Literature survey
- Organization of the material
- Presentation of OHP slides / LCD presentation
- Technical writing

Each student required to:

1. Submit a one page synopsis before the seminar talk for display on the notice board.
2. Give a 20 minutes time for presentation following by a 10 minutes discussion.
3. Submit a detailed technical report on the seminar topic with list of references and slides used.

Seminars are to be scheduled from the 3rd week to the last week of the semester and any change in schedule shall not be entertained.

For award of sessional marks, students are to be judged by at least two faculty members on the basis of an oral and technical report preparation as well as their involvement in the discussions.

ECD 523	MAJOR PROJECT	L	T	P	Cr
		0	0	2	1

Objective: The main objective of the Major Project is to make familiar the students with real life examples of the field of Electronics & Communication Engineering. The students have to prepare a hardware/Software based project related to the field of their interest. The project may be classified as hardware / software / modeling / simulation based project. It may comprise any elements such as analysis, synthesis and design.

The department will appoint a project coordinator who will coordinate the following:

- Allotment of projects and project guides.
- Conduct project - seminars. Each student must be directed to decide on the following aspects
- Organization.
- Internal / External guide.

Each student must present a seminar based on the above aspects as per the following guidelines:

1. Submit a one page synopsis before the seminar talk for display on the notice board.
2. Give a 20 minutes presentation through OHP, PC followed by a 10 minutes discussion.
3. Submit a report on the project giving the list of references.

Project Seminars are to be scheduled from the 3rdweek to the last week of the semester.
The internal marks will be awarded based on preparation, presentation and participation.

ECD 525	DISSERTATION PHASE - I	L	T	P	Cr
		0	0	4	2

Objective: The main objective of the Dissertation Phase - I is to prepare the students for the dissertation to be executed in 4th semester. Solving a real life problem should be focus of Post Graduate dissertation. Faculty members should prepare the project briefs (giving scope and reference) at the beginning of the 3rd semester, which should be made available to the students at the departmental library. The dissertation may be classified as hardware / software / modeling / simulation based work. It may comprise any elements such as analysis, synthesis and design.
The department will appoint a project coordinator who will coordinate the following:

- Title of the dissertation work.
- Organization.
- Internal / External guide.
- Collection of literature related to the dissertation work.

Each student must present a seminar based on the above aspects as per the following guidelines:
1. Submit a one page synopsis before the seminar talk for display on the notice board.
2. Give a 20 minutes presentation through OHP, PC followed by a 10 minutes discussion.
3. Submit a report on the seminar presented giving the list of references.
Project Seminars are to be scheduled from the 3rdweek to the last week of the semester.
The internal marks will be awarded based on preparation, presentation and participation.

ECD 522	DISSERTATION	L	T	P	Cr
		0	0	20	10

The students must be given clear guidelines to execute and complete the project on which they have delivered a seminar in the 3rd semester of the course.

All projects will be monitored at least twice in a semester through student's presentation. Sessional marks should be based on the grades/marks, awarded by a monitoring committee of faculty members as also marks given by the supervisor. Efforts be made that some of the projects are carried out in industries with the help of industry coordinates.

Common norms will be established for documentation of the project report by the respective department.

The final project reports must be submitted two weeks before the last working day of the semester.

The project works must be evaluated by an external examiner and based on his comments a viva voice will be conducted by the departmental committee containing of HOD, two senior faculty and supervisor.