SGT UNIVERSITY
SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY
GURGAON, DELHI-NCR
(Established by the Haryana Act No.8 of 2013)

Curriculum and Syllabi

Masters of Technology
In
Electronics & Communication Engineering

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
FACULTY OF ENGINEERING & TECHNOLOGY
2019 onwards

SGT UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
M. Tech-ECE- 1st semester (2019-2020)

S. No	Course Code	Course Name	L	T	P	C	Int.	Ext	Total Marks
1	13130101	Advanced Microprocessor & Micro Controllers	3	0	0	3	40	60	100
2	13130102	Satellite & Space Communication	3	0	0	3	40	60	100
3	13130103	Information & Communication Theory	3	0	0	3	40	60	100
4	13130104	Advanced Digital Signal processing	3	1	0	4	40	60	100
5	13130105	Satellite Lab.	0	0	4	2	20	30	50
6	13130106	Advanced Microprocessor & Micro Controllers Lab.	0	0	4	2	20	30	50
7		Elective – I	3	0	0	3	40	60	100
Total			**15**	**1**	**8**	**20**	**240**	**360**	**600**
			24						

Elective – I		
8	13130107	Advanced Digital Communication Techniques
9	13130108	Advanced Mathematics for Engineers
10	13130109	Computational methods
11	13130110	Data Communication Networks

13130101	Advanced Microprocessor & Microcontrollers	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Digital Design/Computer Organization and Architecture	3	0	0	3

Course Objectives

1. To gain an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques with peripheral devices
2. To gain an understanding of applications of microprocessors in designing processor-based automated electronics system.

Course Outcomes

On completion of this course, the students will be able to

1. Explain the internal organization and operation of microprocessors/microcontrollers.
2. Program 8086 Microprocessor, 8051 and PIC Microcontrollers for application specific solution
3. Implement and develop new experiments on microprocessor/microcontroller based systems.

Course Description

Microprocessor and microcontrollers are the most useful electronic chips which are used to design and develop processor and computer based automatic smart electronics systems for home and industry application. Students learn CPU architecture, memory interfaces and management, coprocessor interfaces, bus concepts, bus arbitration techniques, interfacing of systems using AD/DA, serial I/O devices, DMA, interrupt control devices, including design, construction, and testing of dedicated microprocessor systems (static and real-time

Course Content

Unit I: Design of basic microprocessor architectural Concepts 08 Hours

Microprocessor architecture, word Lengths, addressable memory, Microprocessor's speed architectural characteristics, registers, instruction, memory addressing architecture, ALU, GPR's Control logic & internal data bus. D/A, A/D interface, special I/O devices, I/O devices;

Unit II: Microprocessor Instructions & Communication 10Hours

Instruction Set, Mnemonics, Basic Instruction Types, Addressing modes, Microprocessor I/O connecting I/O put to Microprocessor, Polling and Interrupts, Interrupt and DM. Controllers. Developing Microprocessor Based Products: Introduction to the Design Process, Preparing the specifications,

Unit III: Microcontroller 14 Hours

Introduction 8051 architecture and programming model. Internal RAM and registers, I/O parts, Interrupt system & Instruction set. Developing a design, Implementing and Testing and design, Regulatory Compliance testing, design tool for Microprocessor Development.

Unit IV: Advanced Microprocessors 12 Hours

Intel X86 family of advanced Microprocessor, programming model for 86 families. X85 addressing modes, instruction set, hardware. Motorola 68 XXX family of microprocessor, 68 XXX addressing modes, instruction set, hardware. Microprocessor I/O: Data Communication, parallel I/O serial communication, Serial interface and UART modems,

Text Books:

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

Reference Books:

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

13130104	Advanced Digital Signal Processing	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Signal & System	3	1	0	4

Course Objectives

1. Students learn the essential advanced topics in digital signal processing that are necessary for successful graduate-level research.
2. The course includes a review of the linear constant-coefficient system properties covered in an undergraduate DSP course, and then examines a variety of multi-rate filter structures, time-varying and adaptive systems, fast algorithms, and other topics.

Course Outcomes: On completion of this course, you should be able to:

1. Master modern signal processing tools including vector spaces, bases and frames, operators, signal expansions and approximation, as well as classical signal processing tools including Fourier and z transforms, filtering, and sampling.
2. Apply the above tools to real-world problems including spectral analysis, filter design, noise cancellation, signal compression, rate conversion, feature extraction, inverse problems, machine learning and justify why these are appropriate tools.

Course Description

Basic concept review of digital signals and systems; computer-aided digital filter design, quantization effects, decimation and interpolation, and fast algorithms for convolution and the DFT; introduction to adaptive signal processing.

Course Content

Unit I. Introduction of DSP: 10Hours

Introduction to Signal Processing, Discrete Linear Systems, superposition Principle, Unit-Sample response, stability & causality Criterion. Design of LP filters using impulse invariance method, bilinear transformation, Phase equalizer, digital all pass filters. Implementation of Filters: Realization block diagrams, Cascade & parallel realization, computation of Fourier series & time sequences from spectra, analog frequency transformation. Digital frequency transformation.

Unit II. Fourier Transform & inverse Fourier transform: 10Hours

Frequency domain design of digital filters, Fourier transform, and use of Fourier transform in Signal processing. The inverse Fourier transform, sampling continuous function to generate a sequence, Reconstruction of continuous –time signals from Discrete-time sequences. Effect of infinite-word length, transfer function of degree 1&2, Sensitivity comparisons, effects of finite precision arithmetic on Digital filters.

Unit III. DFT & FFT & Z transform with Applications: 10Hours

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

Unit IV. Digital Filter Structure & Implementation: 10Hours

Linearity, time invariance & causality, the discrete convolution, the transfer function, stability tests, steady state response, Amplitude & Phase characteristics, stabilization procedure, Ideal LP Filter, Physical reliability & specifications.FIR Filters, Truncation windowing & Delays, design example, IIR Filters: Review of design of analog filters

Text Books

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

Reference Books

1. Rabiner & Gold, “Theory & application of digital Signal Processing”, PHI 1992.

13130102	Satellite And Space Communication	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Digital Communication	3	0	0	3

Course Objectives

1. This course describes orbital mechanism of satellites.
2. The multiplexing and multiple access techniques of Satellite communication are also discussed.
3. GPS and other applications of satellite communication are covered in this course.

Course Outcomes

On completion of this course, the students will be able to

1. Discuss various multiplexing and multiple access techniques.
2. Design satellite uplink and downlink under various conditions.
3. Demonstrate the GPS concepts for ethical usage in society.

Course Description

The courses cover the most relevant aspects of satellite communications, with emphasis on recent applications and developments. The course begins with a review on the history and basic concepts of satellite communications. Next it covers the orbital aspects, with emphasis on the geostationary orbit followed by a discussion of satellite subsystem and launching methods. The design of a digital satellite link is discussed in detail, including link budget, modulation, error control and multiple access methods. Frequency assignments and propagation aspects that affect the satellite link are then discussed. Antennas and earth station technology are presented, including the design of very small aperture terminals (VSATs).

Course Content

Unit I. Introduction: **10Hours**

Satellite communication, Brief History. Space communication, link design description of operational in TELSAT and INSAT system. Coherent and non coherent detection, Error rate performance. Altitude and eclipses.

Unit II. Orbits of satellite: **10Hours**

Low, medium and Geo synchronous main characteristics, Angle period, Returning period, Angle of Evaluation, Propagation Delay, Orbital Spacing. Satellite Links: Delay transponders, Earth Stations, Antennas and Earth coverage,

Unit III. Earth space propagation effects: **10Hours**

Frequency window, Free space loss, Atmospheric absorption, Rainfall Attenuation, Ionospheric scintillation, Telemetry, Tracking and command of
satellites. Detection: QPSK offset QPSK and MSK.

Unit IV. Synchronization: **10Hours**

Principle and techniques, Multiple Access Techniques, FDMA, SPADE system, TDMA system, concept and configuration, system timing frames format, SSMA-Basu
Principles, VSAT, Random access,

Text Books:

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

Reference Books:

1. Tri Ha Digital Satellite Communication Tata Mc Graw Hill.
2. Harry and Vam Trees: Satellite Communication, IEEE Proceedings, 1979.

13130103	Information & Communication Theory	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Signal and systems	3	0	0	3

Course Objectives

1. Concepts of communication engineering.
2. Different analog modulation techniques used.

Course Outcomes: On completion of this course, the students will be able to

1. Understand different modulation and demodulation techniques.
2. Develop the ability to compare and contrast the strengths and weaknesses of various modulation techniques.

Course Description

The Lab subject basically deals with the different aspects of a signal and spectra. It also deals with the modulation of signals and different mathematical aspects related to signals. It gives a more analytical look into the basic entities such as those of signals, modulation, noise etc. which form the base for higher studies in telecommunication.

Course Content

Unit I. Information Theory: 10Hours

Concept of Information and Entropy, Shanon's theorems, Channel Capacity Self information, Discrete and Continuous entropy, Mutual and joint information,
Redundancy. MDS codes & generalized BCH codes,

Unit II. Coding Theory: 10Hours

Source encoding & channel encoding, Error detection & Correction, Various codes for channel coding, Rate Distortion functions. BCH codes, Idempotent & Mattson Solomon polynomials, Reed Solomon codes, Justeen codes,

Unit III. Codes used in Information Theory: 10Hours

Linear block codes, systematic linear codes& optimum coding for Binary symmetric channel, The Generator & parity check matrices, Syndrome decoding & Symmetric channels, Hamming codes,

Unit IV. Performance of codes: 10Hours

Performance of linear block codes & convolution codes, code incurable error probability Upper & lower bounds. Convolution codes & Viterbi decoding algorithm. Weight enumerator, Perfect codes,

Text books:

1. Blahut R.E. , Theory and practice of error control codes, AWL1983.
2. Wilson, Digital Modulation and coding, Pearson

Reference Books:

1. B.P. Lathi, Communication System, Oxford

2. Ranjan Bose, Information Theory, Coding & Cryptography, TMH
3. J. Dass. , S.K. Malik & P.K. Chatterjee, Principles of digitals communication.

13130105	Advanced Digital Communication Techniques	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Signal and systems	3	0	0	3

Course Objectives

1. Concepts of communication engineering.
2. Different analog modulation techniques used.
3. Effects of noise and interference.
4. Systematic comparison of various modulation techniques.

Course Outcomes

On completion of this course, the students will be able to

1. Understand different modulation and demodulation techniques.
2. Apply signal and system analysis tools in the time and frequency domains, including impulse response, convolution, frequency response, Fourier series, Fourier transform, and Hilbert transform.
3. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.

Course Description

Communication is the basic process of exchanging information. **Analog Communication**, as the name suggests is the subject which deals with the techniques employed in communication and basically analog in nature. It is a common knowledge that understanding digital communication is impossible if one does not have a knowledge in analog communication methods.

Course Content

Unit I. **Vector quantization:** **10Hours**

Sub band coding of speech, audio and video signals, linear predictive coding of speech, CELP coders, and MPEG standards for audio and video, controlled IS I, optimum demodulator, for ISI and AWGN.

Unit II. **Characterization of band pass signals and systems:** **10Hours**

orthonormal expansion of signals, representation of digitally modulated signals, non-linear modulation methods, with memory. Optimum demodulation for known signals in additive Gaussian noise.

Unit III. Probability of error for binary and Mary signalling: **10Hours**

DPSK demodulator, carrier and symbol synchronization techniques, characterization of band limited channels and ISI, signal design
for zero ISI,

Unit IV. Liner equalization and decision feedback: **10Hours**

Equalization, adoptive equalize, fading dispersion channels, and tapped delay line mosel optimum demodulation for binary signals over fading disperse channels, RAKE recover.

Text Books:

1. Proakis, J.G, “Digital Communication”, Mc Graw hill 1995
2. Haykin, S., “Digital Communication”, Wiley.

Reference Books:

1. Bhattachary, “Digital Commnication Electrical & Electronic Series”, TMH
2. Couch, “Digital & Analog Commnication System”, Pearson

13130106	Advanced Mathematics For Engineers	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Fundamental of Mathematics	3	0	0	3

Course Description:

The Ideas of Discrete Mathematics are the fundamental to the science and technology specific to the computer age. This subject provides an introduction to some fundamental concepts in Discrete Mathematics for the students. The topics covered include: mathematical logic, proof techniques, especially mathematical induction, set theory, functions, and relations, procedures, recursion, and operation counts, recurrence relations, analysis of algorithms, counting methods, permutations and combinations, graphs and trees.

Course Objectives: The objective of this course is to:

1. Develop a foundation of set theory concepts and notation
2. Develop formal logical reasoning techniques and notation
3. Demonstrate the application of logic to analyzing and writing proofs

Course Outcomes: At the end of the course student will be able to:

1. Construct proofs using direct proof or by contraposition or by contradiction or by cases
2. Construct mathematical arguments using logical connectives and quantifiers and verify the correctness of an argument using propositional and predicate logic and truth tables.
3. Demonstrate the ability to solve problems using counting techniques and combinatory in the context of discrete probability.

Course Content

Unit I. Fourier Transforms **10Hours**

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,

Unit II. Z –Transform **10Hours**

Introduction, Properties of Z- Transform, Evaluation of inverse Z – Transform. Hamilton's Principle and Lagrange's Equation. Rayleigh-Ritz method, Galerkin method. Fourier Transforms of derivative of functions, Relation between Fourier and Laplace transform.

Unit III. Matrices And Linear System Of Equations **10Hours**

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 IV. Conformal Mapping **10Hours**

Conformal mapping, linear transformations, Bi-linear transformations, Schwarz's-Christoffel transformations. Calculus Of Variations: Euler-Lagrange's differential equation, The Brachistochrone problems and other applications. Isoperimetric problem,

Text Book:

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

Reference Books:

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

13130107	Computational Methods	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Digital Communication	3	0	0	3

Course Objectives

1. To educate with the architecture, protocols and network organization of the Internet
2. To update the trends in innovation approach towards development of high speed networks
3. To learn the challenges involved in developing TCP/IP suite wired cum wireless real networks

Course Outcomes

On completion of this course, the students will be able to

1. Explain the layered architecture of computer networks and its imporant
2. Reason out the motivating factors to designn efficient MAC protocol improving spectrum utilization efficiecy
3. Make out the operation of TCP, its application scenarios and constraints in wireless domain

Course Description

This course deals with computer network topologies and OSI reference model. The discussion on MAC protocol and TCP/IP architecture is carried out. This course also deals with routing protocol of mobile networks. At learning this course students will understand the protocols of real networks and technological issues in developing more efficient and high speed real networks

Course Content

Unit I. Computational complexity: 10Hours

Error analysis in science and engineering, Fourier series, Fourier Integral, example of transforms' and orthogonal polynomials, Time series calculation of power spectra, convolution and correlation using FETs, introduction to wavelets.

Unit II. Evaluation of integrals: 10Hours

Elementary Analytical methods, Trapezoidal and Simpson's rules, Summation of series, Gaussian Quadrature and orthogonal 1 polynomials, Multidimensional integrals. Gradient based method, Finite elements method.

Unit III. Ordinary differential equations: 10Hours

Solution in closed form, Power series methods, approximate methods, Predictor and corrector methods, Numerical differentiation, and estimation of errors, extermination of functions, optimization and simple search, simplex method of Nelder and Mend,

Unit IV. Vectors and. Matrices: 10Hours

Solution of .linear and algebraic equations by direct and interactive methods, Gaussian elimination, minimal residual and conjugate gradient methods, preconditioning techniques.

Text Books:

1. Kreyszig F: Advanced Engineering Mathematics, John Wiley seventh ed 1993.
2. Dr. B.S. Grewal, "Numerical Methods in Engg. & science", Khanna Publisher

Reference Books:

1. Gerald/ Wheatley: Applied Numerical Analysis, Pearson Education Asia, 2002.
2. S.S Sastry, "Introduction methods of Numerical analysis",PHI
3. J.B. Scarborough, Numerical Mathematical Analysis, oxford
4. M.K. Jain, "Numerical Solution of differential Equations", Wiley Eastern

13130108	Data Communication Networks	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Digital Communication	3	0	0	3

Course Objectives

1. To educate with the architecture, protocols and network organization of the Internet
2. To update the trends in innovation approach towards development of high speed networks
3. To learn the challenges involved in developing TCP/IP suite wired cum wireless real networks

Course Outcomes

On completion of this course, the students will be able to

1. Explain the layered architecture of computer networks and its important
2. Reason out the motivating factors to design efficient MAC protocol improving spectrum utilization efficiency
3. Make out the operation of TCP, its application scenarios and constraints in wireless domain

Course Description

This course deals with computer network topologies and OSI reference model. The discussion on MAC protocol and TCP/IP architecture is carried out. This course also deals with routing protocol of mobile networks. At learning this course students will understand the protocols of real networks and technological issues in developing more efficient and high speed real networks

Course Content

Unit I. Introduction to Data Transmission: 10Hours

Overview of Data Communication and networking, Analog And Digital Data Transmission, Transmission Impairments, Various Transmission

Media, Data Encoding. Protocol And Architecture, Networking Access protocols, Inter Networking,

Unit II. Digital Data Communication Techniques : 10Hours

Asynchronous And Synchronous Transmission, Error Detection and correction techniques, Physical interfaces, Transport layer Protocols,

Session Service And Protocols, and Presentation/ Application protocols. ISDN Networks: Concepts & Architecture, Protocols

Unit III. Data Link Control: 10Hours

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 IV. Communication Networking Techniques: 10Hours

Communication Networks, Circuit Switching, Message Switching, Packet Switching, Local Networking Technology, The bus / tree topology,

the ring topology, Medium Access control protocols (CSMA/CD, Token ring, FDDI, DQDB). Computer Communication Architecture: OSI and TCP/IP Model,

Text Books :

1. William Stallings, “Data and Computer Communication”, PHI, 4th Ed.
2. Forouzan, “Data communications and networking”, TMH

Reference Books:

1. Andrew Tanenbaum, “Computer Networking”, PHI
2. Godbole, “Data communications and network”, TMH

13130109	Satellite Lab	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Digital Communication	0	0	4	2

Course Objectives

1. This course describes orbital mechanism of satellites.
2. The multiplexing and multiple access techniques of Satellite communication are also discussed.
3. GPS and other applications of satellite communication are covered in this course.

Course Outcomes

On completion of this course, the students will be able to

1. Discuss various multiplexing and multiple access techniques.
2. Design satellite uplink and downlink under various conditions.
3. Demonstrate the GPS concepts for ethical usage in society.

Course Description

The courses cover the most relevant aspects of satellite communications, with emphasis on recent applications and developments. The course begins with a review on the history and basic concepts of satellite communications. Next it covers the orbital aspects, with emphasis on the geostationary orbit followed by a discussion of satellite subsystem and launching methods. The design of a digital satellite link is discussed in detail, including link budget, modulation, error control and multiple access methods. Frequency assignments and propagation aspects that affect the satellite link are then discussed. Antennas and earth station technology are presented, inclu ding the design of very small aperture terminals (VSATs).

(A few experiments may be designed & included in this list depending upon the infrastructure available in the institute)

1. To Study the process of Transmitting Signal.
2. To Study the Base band Signal in a Satellite Link.
3. To estimate C/N Ratio.
4. To estimate S/N Ratio.
5. To setup digital satellite Communication Link.
6. To Study Black & White and Color T.V.
7. To plot radiation pattern of parabolic reflector.
8. To Study Satellite Communication Receiver.
9. To set up a PC to PC Sat. Com.Link using RS –232 port.
10. To measure the propagation delay of signal in a Sat.Com. Link.
11. To transmit & receive the function generator waveform through a Sat.Com. Link.
12. To set up a active & passive satellite communication link & study their difference.

13130110	Advanced Microprocessor &Microcontroller Lab	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Digital Design/Computer Organization and Architecture	0	0	4	2

Course Objectives

1. Understanding and implementation of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques with peripheral devices

Course Outcomes

On completion of this course, the students will be able to:

1. Program 8086 Microprocessor, 8051 and PIC Microcontrollers for application specific solution
2. Design microprocessors/microcontrollers-based systems
3. Implement and develop new experiments on microprocessor/microcontroller based systems.

Course Description

Students will be able to design, construct, program, verify, analyze, and troubleshoot fundamental microprocessor interface and control circuits using related equipments

1. To study the architecture of 8086 Kit.
2. Write an ALP to convert a hexadecimal No. to decimal No. in single step execution (DEBUG)
3. Write an ALP to enter a word from keyboard and to display
4. Write an ALP for addition of two one digit Numbers.
5. Write an ALP to display a string
6. Write an ALP reverses a string
7. Write an ALP to check whether the No. is Palindrome
8. To study the Microcontroller Kit
9. Write an ALP to generate 10 KHz frequency square wave
10. Write an ALP to generate 10 KHz & 100 KHz frequency using interrupt
11. Write an ALP to interface intelligent LCD display
12. Write an ALP to interface intelligent LED display
13. Write an ALP to Switch ON alarm when Microcontroller receive interrupt
14. Write an ALP to interface one microcontroller with other using serial / parallel communication.

SGT UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
M.TECH- ECE-2ND SEMESTER (2019-2020)

S. No	Course Code	Course Name	L	T	P	C	Int	Ext	Total Marks
1	13130201	Electronics System Design	3	0	0	3	40	60	100
2	13130202	Optical Communication	3	0	0	3	40	60	100
3	13130203	VLSI Design	3	1	0	4	40	60	100
4	13130204	Wireless Mobile Communication	3	0	0	3	40	60	100
5	13130205	VLSI Lab.	0	0	4	2	20	30	50
6	13130206	Optical communication Lab.	0	0	4	2	20	30	50
7		Elective-II	3	0	0	3	40	60	100
Total			**15**	**1**	**8**	**20**	**240**	**360**	**600**
			24						

Elective-II		
8	13130207	Switching Systems
9	13130208	Multimedia Systmes
10	13130209	Statistical Models

13130201	Electronics System Design	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Design Systems	3	0	0	3

Course Objectives

1. Understand basic fundamentals of digital electronics and their applications to design combinational and sequential devices.
2. Understand the process to use digital techniques for the designing process of ALU.

Course Outcomes

On completion of this course, the students will be able to

1. T o identify combinational sequential devices .
2. Student can design state machine for a given problem.

Course Description

Course will cover different IC circuit elements start from logic gates to sequential machines. It also describe various types of Programmable Logic Devices and their use to solve the given problem.

Course Content

Unit I. MSI and LSI Circuits And Their Applications: 10Hours

Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR And AND-OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay. Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations,

Unit II. Sequential Machines 10Hours

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, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters, Shift Registers and Memory.

Unit III. Multi Input System Controller Design: 10Hours

System Controllers, Design Phases And System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position And Detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, State Assignment,

Unit IV. Programmable Logic Devices: 10Hours

Programmable System Controllers, ROM, PLA And PAL Based Design. Introduction to the CPLD & FPGA, Asynchronous Finite State Machines: Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, Plotting And Reading The Excitation Map, HAZARDS, Essential Hazards Map Entered Variable, MEV Approaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method.

Text Books:

1. Fletcher, “An Engineering Approach to Digital Design” PHI 1990
2. Z. Kohavi, “Switching and Finite Automata Theory”, TMH

Reference Books

1. Markovitz, “Introduction to Logic Design”, TMH
2. Mano, “ Digital Design”, PHI.

13130202	Optical Communication	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Communication Systems	3	0	0	3

Course Objectives

1. Understand security concepts, Ethics in optical fiber communication.
2. Understand security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant cryptographic techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Comprehend and apply authentication services and mechanisms

Course Outcomes

On completion of this course, the students will be able to

Should be able to identify network security threats and determine efforts to counter them

1) Should be able to write code for relevant algorithms.
2) Should be able to write a secure access client for access to a server
3) Should be able to send and receive secure mails

Course Description

To study various aspects of Edge emitting LEDs, LED to fiber launch systems semiconductor Lasers Theory.

Course Content

Unit I. Introduction: **10Hours**

Advantage of optical fiber communication, Elements of fiber communication link, Ray theory .and electromagnetic mode theory for optical propagation, step index and graded index fibers, Numerical Aperture. polarization control, Homodyne receiver , Reusability and laser line-width, heterodyne receiver , synchronous, Asynchronous and self synchronous demodulation, phase diversity receivers. Theory and their band width noise in APD.

Unit II. Optical fibers, Losses & Dispersion: **10Hours**

Attenuation, Absorption, Linear and non-linear scattering losses, Dispersion, overall fiber dispersion, polarization, fiber bending losses, multimode step index and graded index fibers, single mode fiber, plastic clad and all- plastic fibers, optical fiber cables, dispersion shifted and dispersion flattered fibers, practical fiber profiles.

Unit III. Optical Sources: **10Hours**

Basic concepts: LED for Optical Communication, Burrus type double hetro-structure, Surface emitting LEDs, Shape geometry, Edge emitting LEDs, LED to fiber launch systems semiconductor Lasers Theory, modulation and characteristics, Fabry-Perot lasers quantum well lasers and distributed feedback lasers. Photo Detectors: P.I.N Photo Diodes: Theory and their characteristics, Avalanche photo diode detectors,

Unit IV. Optical fiber communication System: **10Hours**

Optical transmitter circuit : LED and laser drive circuits, optical receiver circuit; Structure, Pre amplifier, AGC, Equalization, Optical power budgeting line loading , analog systems : analog modulation , direct modulation , sub carrier modulation , distribution system, Optical TDM sub-carrier multiplexing ,WDM . Coherent Systems :Coherent receiver, Homodyne and heterodyne detection, noise in coherent receiver,

Text books :

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

Reference Books:

1. Franz JH & Jain VK, “Optical Communication”, Narosa Publns

13130203	VLSI Design	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Digital Design	3	1	0	4

Course Objectives: The student will learn and understand

1. Transistor-Level CMOS Logic Design.
2. Estimation and Optimization of combinational circuits using RC delay models and logical efforts.

Course Outcomes: The students will be able to

1. Create models of moderately sized CMOS circuits that realize specified digital functions.
2. Have an understanding of the characteristics of CMOs circuit construction.

Course Description

A course in VLSI semiconductor devices for designing of Various IC circuits.

Course Content

Unit I. Review of MOS technology: 10Hours

Basic MOS Transistors, Enhancement and Depletion mode transistors, N MOS and C MOS process, thermal aspects of processing, Production of masks. Examples of Combinational logic, Clocked sequential circuits, other system consideration.

Unit II. Electrical properties of MOS circuit : 10Hours

Parameters of MOS transistors, pass transistors, 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 III. Design processes : 10Hours

MOS Layers, stick diagrams, Design rules, AWA OX C MOS process description, double metal single poly silicon, C MOS process. Basic circuit concepts: Sheets resistance, area capacitance, delay unit, inverter delay, super buffers, propagation delays. Subsystem Design & Layout : Architectural issues in VLSI, switch logic, gate logic,

Unit IV. Scaling of MOS circuits : 10Hours

Scaling factor, limitations, scaling of wires and interconnection, PLA and Finite state Machines. Design Examples : Design of an ALU subsystems, carry look ahead address, parallel.

Text Books:

1. Pucknell D. A. and Eshrachain K, “Basic VLSI Design System & Circuits”. (PHI), 1988.
2. Geiger, Rr, Allen P. E. Strader N. R., “VLSI Design Techniques for Analog and Digital Circuit”, MGH1990

Reference Books:

1. Wolf, “Modern VLSI Design”, Pearson
2. SZE, “VLSI Technology”, TMH

13130204	Wireless Mobile Communication	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Telecommunications	3	0	0	3

Course Objectives

1. Understand security concepts, Ethics in Network Security.
2. Understand security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant cryptographic techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Comprehend and apply authentication services and mechanisms

Course Outcomes

On completion of this course, the students will be able to
Should be able to identify network security threats and determine efforts to counter them
1) Should be able to write code for relevant cryptographic algorithms.
2) Should be able to write a secure access client for access to a server
3) Should be able to send and receive secure mails

Course Description

Cryptography and network security To study various aspects of Network Security Attacks, Services and Mechanisms.

Course Content

Unit I. Introduction to mobile radio systems: 10Hours

Paging systems, cordless telephone system, Cellular telephone systems- Cellular concept, frequency reuse, channel assignment strategies, Interference and system capacity, trunking and grade of service, cell splitting, sectoring, microcell zone concept, HO strategies.

Unit II. Mobile radio propagation: 10Hours

mechanism, free space path loss, log-distance path loss models, Okumara model, Hata model, PCS model, Wideband PCS microcell model, indoor propagation models, Jake's channel model, Multi path characteristics of radio waves, signal fading, Time dispersion, Doppler spread, coherence time LCR, fading statistics, diversity techniques

Unit III. Introduction to spread spectrum communication: 10Hours

multiple access techniques used in mobile wireless communication: FDMA/TDMA/CDMA, Cellular CDMA, packet radio protocols, CSMA, reservation protocols, capacity of cellular CDMA, soft HO

Unit IV. Wireless systems and standards: 10Hours

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

Text Books:

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

Reference Books:

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

13130207	Switiching Systems	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Designing system	3	0	0	3

Course Objectives

1. Understand security concepts, Ethics in Network Security.
2. Understand security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant switching techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Comprehend and apply authentication services and mechanisms

Course Outcomes

On completion of this course, the students will be able to
Should be able to identify network security threats and determine efforts to counter them
1) Should be able to write code for relevant cryptographic algorithms.
2) Should be able to write a secure access client for access to a server
3) Should be able to send and receive secure mails

Course Description

To study various aspects of Calculation of blocking probability, stationary probability measures for Ergodic Markov processes.

Course Content

Unit I. Introduction: 10Hours

Basic line circuits in telephony and telegraphy; long-haul communication circuits; statistical bandwidth sharing, principles of traffic switching, & signaling: schemes, CCS7, single stage and multi-stage switching network, principles of large-scale, switch design.

Unit II. Reviewof Switching System: 10Hours

Strowger's and crossbar switches; switching system hierarchy, SPC switching, basic call processing, Level l, 2 & 3 controls, interface controller, network control processor, central processor, switching fabric-SDS, TDS, STS, TST, TTT,

Unit III. Traffic Engineering and Tele-traffic Theory : 10Hours

Markov processes representing traffic. Calculation of blocking probability, stationary probability measures for Ergodic Markov processes. Combinatorial interpretation, calculation of blocking probability.

Unit IV. Switching Network Control and management: 10Hours

Data networks and protocols, ISDN. Message handling systems/ intelligent networks, multi service broadband switching fabrics- ATM., current trends in digital switching systems.

Text Books:

1. Thiagarajan Viswanathan, "Telecommunication Switching Systems and Networks", PHI
2. Syed Riffat Ali, "Digital switching Systems, system reliability and analysis", Tata MC Graw, 2002.

Reference Books:

1. Keshav S, "An Engineering Approach to Computer Network Networking", Addison Wesley, 1998.
2. Martin, "Telecommunication & Computer 3e", PHI

13130208	Multimedia Systems	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Wireless networks	3	0	0	3

Course Objectives

1. Understand security concepts, Digital audio representation and processing.
2. Understand security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant cryptographic techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Comprehend and apply authentication services and mechanisms

Course Outcomes

On completion of this course, the students will be able to

Should be able to identify network security threats and determine efforts to counter them

1) Should be able to write code for relevant cryptographic algorithms.
2) Should be able to write a secure access client for access to a server
3) Should be able to send and receive secure mails

Course Description

To study various aspects of Public Network services and N/W Protocols, Quick time Movie File (QMF).

Course Content

Unit I. Introduction: 10Hours

Concept of Multimedia, Emerging Applications, Multimedia Systems and Appliances. Distributed Multimedia Systems, Synchronization, Orchestration and QOS Architecture standards. Digital audio representation and processing: Audio in computer applications, its digital representation, transmission and digital processing, speech recognition and generation.

Unit II. Digital video and image compression: 10Hours

Video compression techniques and standardization of algorithms, JPEG, MPEG, DVI technology. Multimedia Information Systems: Workstation OS, New OS support, Real Time Mach, Multimedia system service architecture, Media Stream Protocol, service and window system, client control of continuous media, Hyper applications.

Unit III. Multimedia communication systems: 10Hours

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

Unit IV. Multimedia and Internet: 10Hours

The internet, client server technology, Communication Protocols, Internet Addressing, WWW, HTML, and Web Authorizing, Web page browsers and development, bandwidth .and applications considerations, Design Considerations for Web pages, Accessing Content on internet. Multimedia Information systems, File system support, Data Models.

Text Books:

1. John F. Koegel Bufod, "Multimedia Systems", Addison Wesley, Edition. 2000
2. David Hillman, "Multimedia Technology and Application", Galgotia Publication – Edition 1998.

Reference Books:

1. Fred Halsall, "Multimedia Communications", Pearson
2. Rao, Bojkovic & Milovanovic, "Multimedia Comm. System: Techniology , Std. & Network", PHI.

13130209	Statistical Models	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Mathematical tools	3	0	0	3

Course Objectives

1. Understand security concepts, Ethics in Random Variables and distribution function.
2. Understand security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant variance covariance techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Comprehend and apply authentication services and mechanisms

Course Outcomes

On completion of this course, the students will be able to

Should be able to identify network security threats and determine efforts to counter them

1) Should be able to write code for relevant algorithms.
2) Should be able to write a secure access client for access to a server
3) Should be able to send and receive secure mails

Course Description

To study various aspects of Random walk Gambler's ruin problem. Markov chains, higher transition probabilities.

Course Content

Random Variables and distribution function. Probability mas and probablity density fucntion, Two dimentional random varaibles : joint, Marginal and conditional distributions, Independance of random variables.Moments, Expectation, Variance covariance, conditional expectation. Probability generating and Moment generating functions, Characteristics function. Probability distributions; Binominal, Poisson, Geometric, Negative Binomial, Uniform , Exponential, Beta, Gamma, Weibull and Normal General / Stochastic Process, definition, clasification and examples, compound distribution, Random walk Gambler's ruin problem. Markov chains, higher transition probabilities. Classification of states and chain, determination of higher transition probabilities, Stability of Markov systems, limiting behaviour. Poisson process and related distribution, Genratlization of Poisson process. Birth process. Generalized Birth death processes, Linear Birth death processes. Queueing systems, general concepts, Queueing models /M/M/ 1,M/M/1/R,M/M/C,M/M/ ,M/M/C/C, M/E k models.Machine interference problem.

Text book:

1. Bailiey,N.T.J : Elements of stochastic Process.
2. K.S. Trivedi : Probability and Statistics, PHI. 3rdEdition.

ReferenceBooks:

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

13130205	VLSI Lab	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Digital Design	0	0	4	2

Course Objectives

The student will learn and understand

1. Transistor-Level CMOS Logic Design.
2. Estimation and Optimization of combinational circuits.

Course Outcomes

The students will be able to

1. Create models of moderately sized CMOS circuits that realize specified digital functions.

Course Description

A course in VLSI design laboratory will provide a practical knowledge for the implementation of analog and digital VLSI circuits.

A few experiments may be designed & included in this list depending upon the infrastructure available in the institute)

1. Write a spice programme for CMOS inverter with following details. pmos L = .8ym W=12.0um, nmos = 8um W=2.4um, nmos (kp=60u Vto=0.6v) pmos(kp=20u Vto=-0.8v)
2. Write a spice programme for CMOS nand gate with following details : Vdd=5 volt, pmos L=.8 um W=20um, nmos L = 8um W=um, nmos (kp=45u V to = 1.0v) pmos (kp=25u Vto=-1.2v)
3. Write a spice programme for CMOS nor gates with following details : Vdd=5volt, pmos L=8um W=20um, nmos L=Burn W=8um, nmos (kp=45u Vto-1.0v) Pmos (kp=25u Vto=-1.2v)
4. Design a d-latch with clk time period=6ns using nand gates with following specification : L=2U W=100U for n&p-mos, For n-mos Kn'=60U Vto = 0.6V) for p-mos kp=20U Vto=0.8V)
5. Design a half adder using nand gates with following specifications : for n-mos : L=20 W=100U, for p-mos L=2U W=650U, for n- mos Kn'=600 Vto=0.6V) for P-mos Kp=20U Vto=0.8v)
6. Design a full adder using half adder designed above.
7. Design the layout for PMOS in layout editor.
8. Design the Layout for NMOS in layout editor.
9. Design the layout for CMOS inverter with equal rise and fall time in layout editor.
10. Design the layout for 2-Input NAND gate.
11. Design the layout for 2-Input NOR gate.
12. Design the layout for clocked S-R flip-flop.

13130206	Optical Communication Lab	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Communication networks	0	0	4	2

Course Objectives

The student will learn and understand

3. Transistor-Level CMOS Logic Design.
4. Estimation and Optimization of combinational circuits.

Course Outcomes

The students will be able to

2. Create models of moderately sized CMOS circuits that realize specified digital functions.

Course Description

A course in VLSI design laboratory will provide a practical knowledge for the implementation of analog and digital VLSI circuits.

(A few experiments may be designed & included in this list depending upon the infrastructure available in the institute)

1. Study of optical devices.
2. Study of fiber optical detector.
3. Study of fiber optical transmitters
4. Determination of numerical aperture of optical fiber
5. Study of characteristics of LED.
6. Study of characteristics of LASER diode.
7. Setting a fiber optic analog link.
8. Setting a fiber optic digital link.
9. Study of modulation demodulation of light source by direct amplitude modulation techniques.
10. Forming a PC to PC communication link using optical fiber & RS 232.
11. Setting up a fiber optic voice link.
12. Study of modulation & Demodulation of light source by PPM technique.
13. Study of modulation & Demodulation of light source by PWM technique.
14. Study of Propagation loss & sending loss in optical fiber.

SGT University
Faculty of Engineering & Technology
Department of electronics & Communication Engineering
M. Tech-ECE- 3rd semester(2019-2020)

S. No	Semester	Course Code	Course Name	L	T	P	C	Int	Ext	Total Marks
1	III	13130301	Neural Networks & fuzzy Logic	3	1	0	4	40	60	100
2	III	13130302	CDMA System	3	0	0	3	40	60	100
3	III	13130303	Seminar	0	0	6	3	20	30	50
4	III	13130304	Computer Communications	3	0	0	3	40	60	100
5	III	13130305	Dissertation (Phase-I)	0	0	8	4	40	60	100
6	III		Elective- III	3	0	0	3	40	60	100
Total				**12**	**1**	**14**	**20**	**220**	**330**	**550**
				27						

Elective-III		
7	13130306	Reliability Engineering
8	13130307	Emerging Networks Technologies
9	13130308	Digital Signal Processors & Applications
10	13130309	Image Processing

13130301	Neural Networks & Fuzzy Logic	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Digital logical networks	3	1	0	3

Course Objectives

1. Understand security concepts in Neural Network Security.
2. Understand security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant Fuzzy techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Comprehend and apply authentication services and mechanisms

Course Outcomes

On completion of this course, the students will be able to
Should be able to identify network security threats and determine efforts to counter them
1) Should be able to write code for relevant logical algorithms.
2) Should be able to write a secure access client for access to a server
3) Should be able to send and receive secure mails

Course Description

To study various aspects of Radial basis function neural networks.

Course Content

Unit I: Introduction: **10Hours**

Neural networks characteristics, History of development in neural networks principles, Artificial neural net terminology, Model of a neuron, Topology. Fuzzy system design, Antilock Breaking system (ABS), Industrial applications. speech and decision-making.

Unit II: Learning Methods & Neural network models: **10Hours**

Types of learning, Supervised, Unsupervised, Reinforcement learning. Knowledge, representation and acquisition. Basic Hop field model, Basic learning laws, Unsupervised learning, Competitive learning, K-means clustering algorithm, Kohonen‘s feature maps.

Unit III: Artificial Neural Networks: **10Hours**

Radial basis function neural networks, Basic learning laws in RBF nets, Recurrent back propagation. Introduction to counter propagation networks, CMAC network, and ART networks. Applications of neural nets: Applications such as pattern recognition, Pattern mapping, Associative memories,

Unit IV: Fuzzy Logic: **10Hours**

Basic concepts of fuzzy logic, Fuzzy vs. Crisp set, Linguistic variables, Membership functions, Fuzzy sets & Operations of fuzzy sets, Fuzzy IF- THEN rules, Variable inference techniques, De-Fuzzification, Basic fuzzy inference algorithm.

Text Books:

1. B. Yegnanarayana, “ Artificial Neural Networks”PHI
2. J.M. Zurada, “Introduction to artificial neural systems”, Jaico Pub.
3. ROSS J.T , “Fuzzy logic with engineering application”, TMH

Reference Books:

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

13130302	CDMA SYSTEMS	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Multiple Access techniques	3	0	0	3

Course Objectives

1. Understand the architecture of CDMA technology.
2. Understand the functionality of CDMA devices in communication.

Course Outcomes

On completion of this course, the students will be able to

1) Should be able to use the CDMA system for communication system.
2) Should be able to determine error probability and capacity estimation.

Course Description

It have architectural description of CDMA system and also focused on multiple access scheme. It also deals with the process of capacity estimation.

Course Content

Unit I: Direct sequence **10Hours**

frequency hopped spread spectrum, spreading sequence and their correlation functions, Acquisition and tracking of spread spectrum signals.

Unit II: Error probability for DS-CDMA, on AWGN channels **10Hours**

DS- CDMA on frequency selective fading, channels, Performance analysis of cellular CDMA.

Unit III: Capacity Estimation **10Hours**

Power control, effect of imperfect power control on DS CDMA performance, Soft Handoffs.

Unit IV: Spreading /coding tradeoffs, multi-carrier CDMA **10Hours**

IS-95 CDMA system, third generation CDMA systems, multi-user detection.

Text Books:

1. Andrew J. Viterbi, “CDMA Principles of spread spectrum communications”, Addison Wesley 1995.
2. J.S. Lee and L.E. Miller, “ CDMA system Engineering handbook”, Artech house 1998.

Reference Books:

1. Garg, “CDMA : 2000 : Cellular/ PCS system Implementation”, Pearson
2. Steve Lee, “Spread spectrum CDMA”, TMH

13130307	Emerging Network Technologies	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Network Technology	3	0	0	3

Course Objectives

1. Understand security concepts, Ethics in Network Security.
2. Understand security threats, and the security services and mechanisms to counter them

Course Outcomes

On completion of this course, the students will be able to

1) Should be able to deal with various networking and switching devices.
2) Should be able to establish LAN, MAN, WAN for different size of organizations.

Course Description

It will cover various aspects of virtual circuits, different type of switching devices. It also cover system layered architecture for communication and networking topologies.

Course Content

Unit I: Foundations: virtual circuits: 10Hours

PVC, SVC, SPVC, connection oriented and connectionless systems, variable bit rate and constant bit rate applications, flow control and connection management, addressing and identification schemes, multiplexing methodologies, network interface.

Unit II: System & topology: 10Hours

TI/lE I CARRIER systems, topology, X.25, layers, POUs, ISON- typical topology, layers, and PDUs, SS7, FOOl, Frame relay, standards, topology, layers, OSI and ANSI layers. frame relay protocol data unit Frame relay network to network interface.

Unit III: Fast and switched Ethernet: 10Hours

Generation of LANs, switched Ethernet, architecture, store and forward and Cut through switches, virtual LAN, Fast Ethernet, 100BASET. payloads and envelopes, payload pointers, Introduction to broad band signalling networks.

Unit IV: ATM standards & topology: 10Hours

ATM standards, topology, VPI and VCI Labels, ATM layers, ATM and B-ISDN model, cells, ATM switching, AAL types, traffic management in ATM network, SONET/ SDH: synchronous networks, standards, topology, automatic protection switching, multiplexing structure,

Text Books:

1. Uyless Black, " Emerging Communication Technologies", 2nd Ed, Prentice hall 1997.
2. Sumit Kasera and Pankaj Sethi, "ATM Networks, Concepts and Protocols", TMGH 2001

Reference Books:

1. Behrouz Forouzan: Introduction to Data Communication and Networking, Tata Mc-Graw hill 1999.

13130308	Digital Signal Processors And Applications	Learning Schedule			
		L	T	P	C
	Pre-requisites//Exposure: Engineering Mathematics	3	0	0	3

Course Objectives

1. Understand security concepts, Ethics in Network Security.
2. Understand security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant cryptographic techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Comprehend and apply authentication services and mechanisms

Course Outcomes

On completion of this course, the students will be able to
Should be able to identify network security threats and determine efforts to counter them
1) Should be able to write code for relevant cryptographic algorithms.
2) Should be able to write a secure access client for access to a server
3) Should be able to send and receive secure mails

Course Description

Cryptography and network security To study various aspects of Network Security Attacks, Services and Mechanisms.

Course Content

Unit I: SDP 56002 **10Hours**

Architecture, CPU, ALU, Program Controller, Address Generation Unit, Addressing Modes, Interrupt, Priority register.

Unit II: DSP 56002 Instruction Set **10Hours**

Instruction Formats Parallel move operating parallel move types, instructions set, move arithmetic logic, bit manipulation, loop,

Unit III: Applications **10Hours**

Designing and implementing FIR, IIR filters, implementing Fast Fourier. Transforms with DSP 56002.

Unit IV: TMS - 320 Architecture **10Hours**

Instruction Set programmed control instructions.

Text book:

1. Mohammed EL. Sharkawy: Digital Signal Processor Applications with Motorola's DSP 56002. PTR.
2. Venkat Ramani, "Digital Signal Processor :Theory, Programming & Applications", TMH

	Image Processing	Learning Schedule

13130309		L	T	P	C
	Pre-requisites//Exposure: Digital image Processing	**3**	**0**	**0**	**3**

Course Objectives

1. Understand security concepts, Ethics in Network Security.
2. Understand security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant cryptographic techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Comprehend and apply authentication services and mechanisms

Course Outcomes

On completion of this course, the students will be able to

Should be able to identify network security threats and determine efforts to counter them

1) Should be able to write code for relevant algorithms.
2) Should be able to write a secure access client for access to a server
3) Should be able to send and receive secure mails

Course Description

To study various aspects of Degradation model, digitalization of circulate and block circulate metrics.

Course Content

Unit I: Introduction **10Hours**

Elements of Digital Image Processing Systems, Image Acquisition, Storage, Processing Communication Display. Digital Image Fundamentals: Visual Perception, simple image models, concept of uniform and non-uniform sampling & quantization, Relationships between pixels-neighbours of pixel, connectivity labelling of connected components. Relations, equivalence and Transitive closure, Distance measures,

Unit II: Image Transforms **10Hours**

Discrete Fourier transform, 2-D Fourier Transforms and its properties. Fast Fourier transform and its uses. Walsh, Hadamard Discrete cosine, Heir and slant transforms hostelling their algorithms and computer implementations. Image Enhancement: Spatial and frequency domain methods point processing, intensity transformation, Histogram processing image substation and Averaging spatial filtering, LP, HP and homo- morphic felling,

Unit III: Image Restoration **10Hours**

Degradation model, digitalization of circulate and block circulate metrics, Algebraic approved invoice filtering, wiener filter, constrained least square restoration, Interactive restoration in spatial domain geometric transformation. Image Compression: Redundancy models, error free compression, Lossy compression, Image compression standards. generation of spatial marks, Colour image processing.

Unit IV: Image Segmentation **10Hours**

Detection of Discontinuity, Edge detection, Boundary detection, Thresholding, Regional oriented segmentation use of motion in segmentation. Representation and Description: Image analysis, Pattern and their classes, Decision theoretical methods, Structural methods, Interpretation. Arithmetic/ Logic operation, Imaging Geometry Basic and perspective transformation stereo imaging.

Text Books:

1. Anil K Jain, “Fundamentals of Digital Image Processing”, PHI Edition 1997.
2. Keenneth R Castleman, “ Digital Image Processing”, Pearson

Reference Books:

1. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Pearson

	Computer Communications	**Learning Schedule**

13130304		L	T	P	C
	Pre-requisites//Exposure: Communication Networks	**3**	**0**	**0**	**3**

Course Objectives

1. Understand security concepts, Ethics in Network Security.
2. Understand security threats, and the security services and mechanisms to counter them
3. Comprehend and apply relevant cryptographic techniques
4. Comprehend security services and mechanisms in the network protocol stack
5. Comprehend and apply authentication services and mechanisms

Course Outcomes

On completion of this course, the students will be able to

Should be able to identify network security threats and determine efforts to counter them

1) Should be able to write code for relevant cryptographic algorithms.
2) Should be able to write a secure access client for access to a server
3) Should be able to send and receive secure mails

Course Description

To study various aspects of Local area network protocols.

Course Content

Unit I: Data communication **10Hours**

Introduction to data communication. Concept of analog and digital signals. Bandwidth. Transmission media. Wired and wireless connectivity. FDM, TDM and CDMA. Circuit and packet switching. Frame relay and ATM switching. ISDN. Network architecture: Basics of OSI and TCP/IP reference models. Example architecture of other reference models.

Unit II: **Network protocols** **10Hours**

Local area network protocols. IEEE standards for LAN. Fibre optic networks. Satellite networks. Data link layer design issues: its functions and protocols. Internet Protocol: Internet protocol. Routing algorithms. Congestion control algorithms. IP addressing schemes. Internetworking and sub-netting, reliability considerations.

Unit III: **Transport and application layer** **10Hours**

Transport and application layer design issues, Connection management. Transport protocol on top of X.25. File transfer and access management. Cryptography: Traditional cryptography. The Data Encryption Standard. Key distribution problem. Public cryptography. Authentication and digital signatures.

Unit IV: Modelling and Analysis **10Hours**

Modelling and Analysis of Computer Communication Networks: Pure Birth and Birth-Death Process. Bernoulli Trials-Markov Chains. Poisson Process. Calculation of Delay-Little's Formula, Burke's Theorem. Queueing Models: M/M/1, M/M/1/N, M/M/S, M/M/S/N queues. Imbedded Markov Chains-M/G/1 queue. Network layout

Text Books:

1. Stallings, "Data communication & Networking", PHI
2. Tanenbaum, "Computer Networks", PHI

References Books:

1. Jeremiah F. Hayes: Modelling and Analysis of Computer Communication Networks, PHI
2. Forouzan, "Data communications and networking", TMH
3. Godbole, "Data communications and network", TMH

	Reliability Engineering	**Learning Schedule**

13130306		L	T	P	C
	Pre-requisites//Exposure: Reliability Testing	**3**	**0**	**0**	**3**

Course Objectives

1. Understand Reliability concepts.
2. Understand the methodology to test the reliability system and compensate errors

Course Outcomes

On completion of this course, the students will be able to

Should be able to identify network security threats and determine efforts to counter them

1) Should be able to write code for relevant cryptographic algorithms.

2) Should be able to write a secure access client for access to a server

3) Should be able to send and receive secure mails

Course Description

To study various aspects of Reliability in Systems.

Course Content

Unit I: Introduction **10Hours**

Definition for Reliability Need for Reliability engineering, Causes of failures, catastrophic failures and deg- radiation failures. Characteristics types of failures, useful life of components, Exponential case of chance failures, Reliability measures, Derivation for exponential distribution function, other kinds of distributions, Binomial, Poisson uniform, Rayleigh, Weibull, Gamma distribution, Markov chains, failures data analysis.

Unit II: Reliability in Systems **10Hours**

Reliability Block Diagrams, series systems, parallel systems, K- out of M systems, Open and short circuit failures, standby systems. Reliability Analysis of Non- series Parallel system, Cut-set approach, Bayes Theorem Method. Reliability Prediction: Objective of reliability Prediction, Classification, Information sources for failure rate data , prediction methodologies, general requirement, role and limitations of reliability prediction.

Unit III: Reliability Allocation **10Hours**

Subsystems reliability improvement, Apportionment for new units, critically. Redundancy Techniques for reliability: Forms of maintenance, measures of maintainability and availability, maintainability function, availability function, two unit parallel system with re- pair, Markov model for two unit systems, preventive maintenance provisioning of spares.

Unit IV: Reliability Testing **10Hours**

Kinds of testing, components reliability measurements parametric methods, confidence limits, accelerate testing, equipment acceptance testing. Economics of Reliability Engineering: Reliability cost, effect of reliability on cost. Reliability achievement cost models, re- placement policies. Integrated performance measures for communication system: Integration of reliability and capacity, Delay related reliability.

Text Books :

1. KK Agarwal, " Reliability Engineering ", Kluwer Academic Netherlands.

2. B Singh," Quality Control Reliability Analysis", Khanna Publishers.

3. Balaguruswamy: Reliability Engineering

Reference Books :

1. KB Mishra: Reliability Prediction & Analysis : A Methodology oriented treatment, Elseveir, Netherlands.

2. Ebeling," Introduction to Reliability & Maintainability", TMH

	Seminar	**Learning Schedule**

13130303		L	T	P	C
	Pre-requisites//Exposure: Communication Skills	**0**	**0**	**6**	**3**

Every student will be required to present a seminar talk on a topic approved by the department except on his/her dissertation. The committee constituted by the Head of the department will evaluate the presentation and will award one of the grades out of A+, A, B, C, D and E. A Student who is awarded the 'F' grade will be required to repeat the seminar on the same topic.

	Dissertation (Phase-I)	**Learning Schedule**

13130305		L	T	P	C
	Pre-requisites//Exposure: Software/ Hardware	**0**	**0**	**8**	**4**

Every student will carry out dissertation under the supervision of a Supervisor(s). The topic shall be approved by a Committee constituted by the Head of the concerned department. Every student will be required to present two seminar talks, first at the beginning of the Dissertation (Phase-I) to present the scope of the work and to finalize the topic, and second towards the end of the semester, presenting the work carried out by him/her in the semester. The committee constituted will screen both the presentations so as to award the sessional grades out of A+, A, B, C, D and E. A student scoring 'F' grade shall have to improve this grade before continuing his/her Dissertation in the 4th semester failing which he/she shall have to repeat the Dissertation (Phase-I) next time in the regular 3rd semester.

Department of electronics & Communication Engineering

M. Tech- 4th semester

S. No	Course Code	Course Name	L	T	P	C	Int.	Ext	Total Marks
1	13130401	Dissertation	0	0	20	10	80	120	200
			0	**0**	**20**	**10**	**80**	**120**	**200**
			20						

	Dissertation	Learning Schedule

13130401		L	T	P	C
	Pre-requisites//Exposure: Software/ Hardware	**0**	**0**	**20**	**10**

The Dissertation Phase-1 will be continued as dissertation in 4th Semester. The award of sessional grades out of A+, A, B, C, D and E will be done by an internal Committee constituted by the Head of the Department. This assessment shall be based on presentation (s), report, etc. before this committee. In case a student scores 'F' –grade in the sessional, failing which he/ she will not be allowed to submit the dissertation. At the end of the semester, every student will be required to submit three bound copies of his/her Master's dissertation of the office of the concerned Department. Out of these, one copy will be kept for department record & one copy shall be for the supervisor. A copy of the dissertation will be sent to the external examiner by mail by the concerned department, after his/her appointment and intimation from the university.

Dissertation will be evaluated by a committee of examiners consisting of the Head of the Department, dissertation supervisor(s) and one external examiner. There shall be no requirement of a separate evaluation report on the Master Dissertation from the external examiner. The external examiner shall be appointed by the University from a panel of examiners submitted by the respective Head of Department, to the Chairman, Board of Studies. In case the external examiner, appointed by the University does not turn up, the Director/ Principal of the concerned college, on the recommendation of the concerned Head of the department shall be authorized, on behalf of the University, to appoint an external examiner from some other institution.

The student will defend his/her dissertation through presentation before this committee and the committee will award one of the grades out of A+, A, B, C, D and E Student scoring 'F' grade in the exam shall have to resubmit his/her Dissertation after making all correction / improvements and this dissertation shall be evaluated as above.

Note: The Scheme of awarding the Grades to the student in the course will be supplied by the University to the examiner(s).

The performance of the student of M. Tech Electronics & Communication Engineering Course shall be graded on the basis of percentage of marks and corresponding grades as mentioned below:

Marks	Grade	Marks
85	< A+ <	100
75	< A <	85
60	< B <	75
50	< C <	60
40	< D <	50
00	< E <	40

Letter Grades	Performance	Division
A+	Excellent	First
A	Very Good	First
B	Good	First
C	Fair	Second
D	Pass	Third
E	Repeat	Fail

Note:

A. The candidate, who have passed all the semesters examination in the first attempt obtaining at least 75% marks in aggregate shall be declared to have passed in the first division with Distinction mentioned in the degree.
B. Actual percentage of Marks Obtained and Corresponding grades should be mentioned on detailed marks certificate of student. To obtain 'D' grade a student must have secure at least 40% marks in each subject of the semester Examination.
C. Student who earned and 'E' grade or less than 40% marks in any subject shall have re-appear in that subject.