ECE

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SYLLABUS OF
M. TECH ELECTRONICS & COMMUNICATION ENGINEERING

HIMACHAL PRADESH UNIVERSITY
SUMMER HILL
SHIMLA-5

Scheme & Syllabus of M Tech E&CE is hereby approved

02/7/2010

02/07/10

DETAILED SYLLABUS FOR THE PROPOSED COURSE

MASTER OF TECHNOLOGY ELECTRONICS & COMMUNICATION ENGG.

STUDY AND EVALUATION SCHEME

Course No	Subjects	Study scheme hours / week				Evaluation Scheme						Total Marks
		L	T	P/D	Total	Internal Assessment Marks		External Assessment Marks				
						Theory	Practical	Theory	Hrs	Practical	Hrs	
FIRST SEMESTER												
EC-101	Design of Wireless & Mobile Communication systems	3	1	0	4	50	---	100	3	---	---	150
EC-102	Design of Electronics System s	3	1	0	4	50	---	100	3	---	---	150
EC-103	Design of Data communication Network.	3	1	0	4	50	---	100	3	---	---	150
EC-104	Design of Advance Digital Communication Systems.	3	1	0	4	50	---	100	3	---	---	150
EC-105	Information Theory & Random Signals	3	1	0	4	50	---	100	3	---	---	150
EC-106	Laboratory -1	0	0	4	4	---	50	---	---	100	3	150
Total		15	5	4	24	250	50	500	---	100	---	900
SECOND SEMESTER												
EC-201	Design of Optical Networks	3	1	0	4	50	---	100	3	---	---	150
EC-202	Image Processing	3	1	0	4	50	---	100	3	---	---	150
EC-203	Computational Technique	3	1	0	4	50	---	100	3	---	---	150
EC-	*Elective -1	3	1	0	4	50	---	100	3	---	---	150
EC-	*Elective-2	3	1	0	4	50	---	100	3	---	---	150
EC-210	Laboratory -2	0	0	4	4	---	50	---	---	100	3	150
Total		15	5	4	24	250	50	500	---	100	---	900
THIRD SEMESTER												
EC-	*Elective -3	3	1	0	4	50	---	100	3	---	---	150
EC-	*Elective -4	3	1	0	4	50	---	100	3	---	---	150
EC-	*Elective -5	3	1	0	4	50	---	100	3	---	---	150
EC-301	Project	0	0	8	8	---	200	---	---	100	3	300
EC-302	Seminar	0	0	4	4	---	50	---	---	100	3	150
Total		9	3	12	24	150	250	300	---	200	---	900

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FOURTH SEMESTER					
			Assessment Marks		
			Internal		External / University Exam
Course No	Subjects	Hrs. / Week	Continual Assessment by Supervisor (a)	** Mid- Semester Evaluation	Final Viva – Voce Examination (c)
EC- 500	Dissertation	24	300	200	400
Total Marks(a+b+c)					900

** Higher weightage will be given for publication in Journal / Paper Presentation in Conference
Abbreviations used: L = Lecture, T = Tutorial, P/D = Practical / Demonstration

Explanation:

- For evaluation of the dissertation the rules regulations and ordinances of the Himachal Pradesh University is to be followed

GRAND TOTAL MARKS OF ALL SEMESTERS	3600

ELECTIVES [One Elective Subject may be considered from Each Group]

Course No	Subjects	Study scheme hours / week				Evaluation Scheme						Total Marks
		L	T	P/ D	Total	Internal Assessment Marks		External Assessment Marks				
						Theory	Practical	Theory	Hrs	Practical	Hrs	
ELECTIVE GROUP ONE												
EC- 204	Advance Microprocessor & Embedded System	3	1	0	4	50	---	100	3	---	---	150
EC- 205	Reliability of Electronics Communication System	3	1	0	4	50	---	100	3	---	---	150
EC- 206	Advanced Antenna system	3	1	0	4	50	---	100	3	---	---	150
ELECTIVE GROUP TWO												
EC- 207	Peripheral System Design & Interfacing	3	1	0	4	50	---	100	3	---	---	150
EC- 208	Modeling & Simulation of Communication System	3	1	0	4	50	---	100	3	---	---	150
EC- 209	Microwave Theory & Techniques	3	1	0	4	50	---	100	3	---	---	150
ELECTIVE GROUP THREE												
EC- 303	Computer Communication Networks	3	1	0	4	50	---	100	3	---	---	150
EC- 304	Digital Signal processing	3	1	0	4	50	---	100	3	---	---	150
EC- 305	Information Securities	3	1	0	4	50	---	100	3	---	---	150
ELECTIVE GROUP FOUR												
EC- 306	Advanced Mathematics	3	1	0	4	50	---	100	3	---	---	150
EC- 307	Design of C-MOS VLSI system	3	1	0	4	50	---	100	3	---	---	150
EC- 308	Design of VLSI System	3	1	0	4	50	---	100	3	---	---	150
ELECTIVE GROUP FIVE												
EC- 309	Microwave & Optoelectronics Devices	3	1	0	4	50	---	100	3	---	---	150
EC- 310	PLCs & SCADA	3	1	0	4	50	---	100	3	---	---	150
EC- 311	Neural Networks & Fuzzy Logics	3	1	0	4	50	---	100	3	---	---	150

* 50% of the total marks allocated in the theory & practical will be minimum pass marks

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Design of Wireless and Mobile Communication systems **EC-101**

Course Code	EC-101		L-3,T-1,P-0
Name of the Course	**Design of Wireless and Mobile Communication systems**		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks are to be set covering the whole syllabus and any five to be attempted.*

UNIT-I

Introduction

Technical Background, Transmission Fundamentals, Communication Networks, Protocols and TCP/IP Suite

UNIT-II

Wireless Communication Technology

Antennas and Propagation Signal, Encoding Techniques, Spread Spectrum Coding and Error Control

UNIT-III

Wireless Networking & Wireless LANs

Satellite Communications, Cellular Transmission Principles, Cordless Systems and Wireless Local Loop Mobile IP and Wireless access protocol, Wireless LAN Technology, IEEE 802, 11 Wireless LAN standards.

UNIT-IV

CDMA Standards,

System Architecture for CDMA. Network and Data Link Layers of CDMA. Signaling Applications in CDMA System. Voice Applications in CDMA System.

UNIT - V

RF Engineering and Facilities

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

<u>Text Books</u>

1. Applications of CDMA in Wireless/Personal Communications - by V K Garg, Smolik

2. Principles and Applications of GSM - byV K Garg Prentice Hall

3. Wireless Communication and Networks - by Stallings

<u>Reference Books</u>

1. Mobile Communication Schiller Prentice Hall

2. Mobile Communication - by Lee, Pearson

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Design of Electronics Systems **EC-102**

Course Code	EC-102		L-3,T-1,P-0
Name of the Course	Design of Electronics Systems		
Lectures to be delivered	52 (1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT - I

Introduction to Digital Design Concepts:

Design Constraints and Logic Representation of System .Analog interfacing: A/D conversion concepts, Analog & Digital Conversion related errors. Combinational Logic Design and Implementation: Multiplexer/Decoder, PLA/Pal/GAL,ROM,CPLD and FPGA level customized design, ALU, VHDL models and simulations of combinational circuits.

UNIT – II

MSI and LSI Circuits and Their Applications Arithmetic

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

UNIT - III

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, 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 - IV

Multi Input System Controller,

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

UNIT - V

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

Text Books

1. An Engineering Approach To Digital Design - by Fletcher PHI 1990
2. Designing With TTL Circuits - by Texas Instruments.

Reference Books

1. An Engineering Approach to Digital Design –W.J.Fletcher
2. Digital Design –M. Morris Mano

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Design of Data Communication Networks **EC-103**

Course Code	EC-103		L-3,T-1,P-0
Name of the Course	Design of Data Communication Networks		
Lectures to be delivered	52 (1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Data Transmission, Digital Data Communication Techniques

Overview of Data Communication and networking, Analog And Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding. Asynchronous And Synchronous Transmission, Error Detection and correction techniques, Physical interfaces

UNIT – II

Data Link Control & Multiplexing

Link Configurations, Protocol principles (Error control, Flow control), Bit Oriented and character oriented protocol, Data link layer services, Link Control. F.D.M. Synchronous TDM, Statistical TDM

UNIT – III

Switching and Computer Networks

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

UNIT – IV

ATM Networks & Computer Communication Architecture

Concepts, history, Architecture, Convergence and challenges, Protocol and Architecture, Inter Networking, IP addressing, structure of IP, IPv4, IPv6, and Transport layer Protocols, Session Service and Protocols, and Presentation/Application Controls.

UNIT – V

Network Operating Systems & Network security

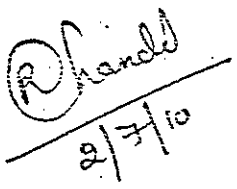
Overview of network operating systems (Windows NT/Unix/Linux), Mobile IP33N Operating System Security issues, concept of firewalls, intrusion detection Systems

<u>Text Books</u>

1. Data And Computer Communication - by William Stallings, Prentice Hall, 4th Ed.
2. Computer Networking - by Andrew Tanenbaum.
3. Data communications and networking - by Forouzan

<u>Reference Books</u>

1. Engg. approach to Computer Networking - by Srinivasan Keshav, Pearson Edu.
2. Data Networks - by Bertsekas prentice Hall
3. Related IEEE/IEE publications



Design of Advanced Digital Communication Systems **EC-104**

Course Code	EC-104		L-3,T-1,P-0
Name of the Course	Design of Advanced Digital Communication Systems		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Elements of a Digital communication system, communication channels and their characteristics, mathematical models for communication channels, recent trends in digital communication, Deterministic and Random Signal Analysis, Band pass and Low pass Signal Representation, Signal space representation of waveforms.

UNIT – II

Digital modulation Schemes

Representations of digitally modulated signals, memory less modulation methods, PAM,PM,QAM, multidimensional signaling, Signaling scheme with memory, CPFSK,CPM, Power spectrum of Digitally modulated signals, PSD of a digitally modulated signals with memory, PSD of linearly modulated signals.

UNIT – III

Optimum Receivers for Additive White Gaussian Noise Channels

Waveforms and vector channel models, waveforms and Vector AWGN channels, Optimum detection for the Vector AWGN channel, Implementation of the optimal receiver for AWGN channels, the correlation receiver, matched filter receiver, frequency domain interpretation of the matched filter. Performance analysis for wire line and radio communication system.

UNIT – IV

Carrier and symbol synchronization

Signal parameter estimation, the likelihood function, carrier recovery and symbol synchronization in signal demodulation, carrier phase estimation, maximum likelihood carrier phase estimation, phase locked loop, effect of noise on the phase estimation, symbol timing estimation, maximum likelihood timing estimation , non –decision directed timing estimation.

UNIT – V

Multichannel and Multicarrier System & Spread Spectrum Signals for Digital Communication

Multichannel Digital Communication in AWGN channels, binary signals, M-ary orthogonal signals, Multicarrier communication, single-carrier versus multicarrier modulation, Capacity of a Nonideal linera filter channel, orthogonal frequency division multiplexing (OFDM), modulation and demodulation in an OFDM system, Spectral characteristics of multicarrier signals, Bit and Power allocation in multicarrier modulation. Model of spread spectrum digital communication system, direct sequence spread spectrum signals, frequency hopped spread spectrum signals, CDMA system based on FHSS signals, Synchronization of spread spectrum systems.

Text Books Recommended:

1. Digital Communications by JG Proakis & M Salehi, 5th Edition McGraw Hill
2. Principle of Communication systems –Taub & Schilling,Tata Mc Graw Hill

Reference books

1. Digital Communication –Simon Haykins , John Wiley & Sons.

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Information Theory & Random Signals

Course Code	**EC-105**		EC-105
Name of the Course	**Information Theory & Random Signals**		L-3,T-1,P-0
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Measures of information & Data compression by fixed-to-variable-length codes:
Entropy, relative entropy and mutual information. Basic inequalities (Jensen, log-sum, Fano, data processing theorem). Unique decodability and the prefix condition. Kraft inequality, relationship of average codeword length to source entropy. Examples of coding techniques: Huffman, Shannon-Fano-Elias, Lempel-Ziv, universal.

UNIT – II

Data compression of discrete memoryless sources, Entropy rate of stationary sources& Discrete memoryless channels
fixed-to-fixed-length codes. Typicality and the asymptotic equi-partition property. Interpretation of entropy of this context. . Stationary Markov sources: entropy rate and data compression. Definition of capacity and its computation. Communication over discrete channels, Measures of information & Discrete-time Gaussian channels and their capacity the channel coding theorem and the physical significance of capacity. Feedback in memoryless channels. The joint source-channel coding theorem. Elementary parity-check codes; maximum likelihood decoding. for sources with continuous range. Simple and parallel configurations. White and colored noise. Extension to band-limited waveform channels.

UNIT - III

Vector quantization of a discrete-time memoryless source under a fidelity criterion. Definition of the rate distortion function and its computation in simple cases. The rate distortion theorem.Probability functions, conditional probability, independence, random variables, probability distributions, conditional, distributions, transformations, expectations and moments, conditional expectation, bi- and multi-variate distributions, transformations, random processes, covariance and spectral density, Gaussian, Brownian, and Poisson types.

UNIT - IV

Continuous Information; Density; Noisy Channel Coding Theorem:
Extensions of the discrete entropies and measures to the continuous case. 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 – V

Error Control Coding & Advanced Coding Techniques and Cryptography:
Linear blocks codes and their properties, hard-decision decoding, cyclic codes, Convolution codes, Soft-decision decoding, Viterbi decoding algorithm. BCH codes, Trellis coded modulation, introduction to cryptography, overview of encryption techniques, symmetric cryptography, DES, IDEA, asymmetric algorithms, RSA algorithm.

Text Books

1. T.M. Cover and J.A. Thomas, *Elements of Information Theory*, John Wiley (1991).
2. R.G. Gallager, Information Theory and Reliable Communication, Wiley (1968). for Discrete Memoryless Systems, Academic Press (1981).
3. R.J. McEliece, *The Theory of Information and Coding*, Addison-Wesley (1977).

Reference Books

1. M.Mansuripur, Introduction to information Theory: Prentice Hall,1987
2. Taub & Schilling, Principles of communication, McGraw Hill
3. Thomas Cover & Joy Thomas, Elements of Information Theory, John Wiley & Sons

Lab-I

EC-106

Course Code	**EC-106**		P-3Hrs
Name of the Course	**Lab-I**		
Lab Session	26Hrs		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for Sessional (based on Lab work 30%, Lab Record 25%, Viva 25%, Attendance 20%)		Max. Marks: 50	

LIST OF EXPERIMENTS

1 (a) To configure modem of a computer.
(b) To make interconnections in cables of data communication in LAN.
2 To install LAN using following topologies.
(a). Bus topology. (b). RING topology
(c). To configure hub or switch
3. (a) To study PCM, delta modulation and demodulation.
(b)To study delta, sigma modulation and demodulation.
4. (a)To study TDM-PAM , TDM-PCM
(b) To study PSK, FSK, Ask.
5. (a).Familiarization with neural network and fuzzy logic by using toolboxes of mat lab.
(b) Problem solving using artificial neural network and fuggy logic using tool boxes of mat lab
6. (a) Design a mod-8 counter using JK flip flop.
(b) Design a single stage amplifier.
7. Design of a differentiator to differentiate a I/P signal that varies in frequency from 10Hz to 1 kHz.
8. Design a 60 Hz active notch filter.
9. (a) Design a square wave generator using 555 timer.
(b) Design a RC phase shift oscillator using 741 IC
10. Design a Wein bridge oscillator using 741 IC

Reference Books

1.Digital Design principles and practices by J.F.Wakerly
2.Digital Systems-Principles and applications-Ronald Tocci.
3.Principles of Digital Design –Daniel D.Gajaski, Prentice Hall
4. MATLAB by Rudrapratab
5. Linear Integrated Circuits By Ramakant Gayakward
6 G.Keiser, " Optical fiber communication ", Systems, McGraw-Hill, New York, 2000.
7. Franz & Jain, " Optical communication ", Systems and components, Narosa Publications, New Delhi, 2000.

* Software Used: Or-Cad, MATLAB, XiLinx, (Latest Version)

Design of Optical Networks Systems **EC-201**

Course Code	**EC-201**		L-3,T-1,P-0
Name of the Course	**Design of Optical Networks Systems**		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Introduction to Optical Network & Optical Amplifiers: Services, Circuit Switching, Packet Switching, Optical Networks, Optical Layer, Transparency and All Optical Networks, Optical Packet Switching, Transmission Basics, Network Evolution. Stimulated Emission, Spontaneous Emission, Erbium Doped Fiber amplifiers, Raman amplifiers, Semiconductor Optical Amplifiers, Cross talk in SOAs.

UNIT – II

Multiplexers and Filters to Wavelength Converters: Gratings, Diffraction Pattern, Bragg Gratings, Fiber Gratings, Fabry-Perot filters, Multilayer Dielectric Thin-Film Filters, Mach-Zehnder Interferometers, Arrayed Waveguide Grating, Acousto-Optic Tunable Filter, High channel Count Multiplexer Architectures, Optoelectronics Approach, Optical Gating, Interferometric Techniques, Wave Mixing.

UNIT – III

Transmission System Engineering: System Model, Power Penalty, Transmitter, Receiver, Optical Amplifiers, Cross talk, Dispersion, Fiber Nonlinearities, Wavelength Stabilization Design of Soliton Systems, Design of Dispersion –Managed Soliton Systems.

UNIT – IV

Client Layers of the Optical Layer: SONET/SDH, ATM, IP, Storage Area Networks, Gigabit and 10-Gigabit Ethernet.

UNIT – V

WDM Network Elements & Design & Access Networks:: Optical Line Terminals, Optical Line Amplifiers, Optical Add/Drop Multiplexers, Optical Cross connects. Cost Trade-Offs: A Detailed Ring Network Example, LTD and RWA Problems, Dimensioning Wavelength-Routing Networks, Statistical Dimensioning Models, Maximum Load Dimensioning Models Network Architecture Overview, Enhanced HFC, fiber to the Curb (FTTC).

Text Books

1. Optical Networks: A practical Perspective. RAMASWAMI & K.N. SIVARAJAN Morgan Kaufmann 2nd Edition. *G.P.* Agarwal, " Fiber optic communication systems ", 2nd Edition, John Wiley & Sons, New York, 1997.
2. Franz and Jain, " Optical communication system ", Narosa Publications, New Delhi, 1995.
3. G.Keiser, " Optical fiber communication ", Systems, McGraw-Hill, New York, 2000.

Reference Books

1. Franz & Jain, " Optical communication ", Systems and components, Narosa Publications, New Delhi, 2000.
2. Multiwavelength Optical Networks: A Layered Approach Thomas E. Stern and Krishna Bala Addison Wesley
3. Introduction to Optical Fiber Communications Systems William B. Jones HRW
4. Optical WDM Networks Principles and Practice Edited by K. M. Sivalingam & S. Subramaniam Kluwer Academic Publisher

Image Processing

			EC-202
Course Code	EC-202		L-3,T-1,P-0
Name of the Course	Image Processing		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT-I

Introduction & Basic Image Fundamentals:

Fundamental concept of digital image processing, component of image processing system, image acquisition Pixels, sampling, quantization, resolution, representation as a matrix, operation, camera angles and perspective transformation.

UNIT-II

Image Enhancement:

Concept of Spatial Domain and Frequency domain enhancement, Basic Gray Level Transformation, Histogram Processing, Enhancement using Arithmetic/logic Operations, Subtraction, Averaging, Basics of Spatial Filtering.

UNIT-III

Image Restoration

Model of the image Degradation/Restoration Process, Noise Models, Restoration in the presence of Noise, point spread function Different point spread functions, Blurring, De-blurring Algorithm.

UNIT-IV

Image Processing & Image Compression:

Color Fundamentals, Color Models, Basics of Full-Color image processing, Color Transformations. Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression.

UNIT-V

Image Segmentation & Representation:

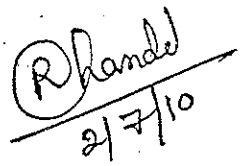
Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors, Regional Descriptors

Text Books:

1. Digital Image processing by R.C. Gonzalez and R.F.Woods (Pearson Education)
2. Algorithms for image Processing and Computer Vision by James R.Parker
3. Fundamentals of Digital Image Processing by A.K Jain

Reference Books

1. The Image Processing Handbook, Fourth Edition by John C. Ruses
2. Digital Image Processing by W.K.Pratt
3. Digital Image Processing using MATLAB by Woods & Gonzalez (Pearson Education)



Computational Techniques **EC- 203**

Course Code	**EC- 203**		L-3,T-1,P-0
Name of the Course	**Computational Techniques**		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Functions, polynomials:

Functions, polynomials and their zeros. Bracketing of a root. Bisection and Newton - Raphson methods and their convergence. Iterative method for equations of the form $x = \phi(x)$.

Interpolating polynomial. Lagrange form with error. Divided differences. Hermite interpolation, Numerical differentiation and integration. Gauss quadrature. Romberg integration. Solution of a system of linear algebraic equations by Gauss elimination and Gauss seidel methods. LU ecomposition. Solution of a tridiagonal systems. Eigenvalue problem-largest and smallest eigenvalues by interation. Method of least squares.

UNIT – II

Solutions of Linear Algebraic Equation

Solution of initial value problems by Runge-Kutta, Predictor – corrector and Adam – Bashforth methods. Finite difference method for boundary value problems in ODE. Shooting method. Solution of Laplace and Poisson equations by finite difference method (Dirichlet)

UNIT-III

Solution of nonlinear Equation:

Solution of two or more nonlinear equations by iterative methods (Picard and Newton's methods) Spline interpolation, cubic splines, Chebyshev polynomials, Minimax approximation. Eigenvalues and vectors of a real symmetric matrix – Jacobi method. Eigenvalue problem for ordinary differential equations.

UNIT-IV

Numerical solution of a parabolic equations

Numerical solution of a parabolic equation. Explicit method, simple implicit method and Crank-Nicholson method. Stability. Numerical Solution of elliptic problems. Dirichlet and Neumann problems (Cartesian and Polar coordinates)

UNIT -V

Numerical solution of hyperbolic equations.

Numerical solution of hyperbolic equations. Explicit method. Method of characteristics. Stability. The finite element method – Ritz, collocation and Galerkin methods. Boundary value problems for ordinary differential equations. Shape functions. Assembly of element equations.

Text Books

1. Smith G. D. "Numerical Solution of Partial Differential Equation", Oxford, 1965.
2. Chapra, S.C, Canale R P "Numerical Methods for Engineers" 3rd Ed., McGraw-Hill 1998.
3. Kreyszig, E, "Advanced Engineering Mathematics", John Wiley, 8th ed., 2002.

Reference Books

1. Gerald, C.F., "Applied Numerical Analysis", 6th Ed., Pearson, 1999.
2. Niyogi, P. "Numerical Analysis and Algorithms", TMH, 2003.
3. Conte, S.D. de Boor, C. "Elementary Numerical Analysis" McGraw-Hill.
4. Strang, G., Fix, G.J. "An Analysis of Finite Element Method" Prentice Hall, 1973.
5. Jain M. K. "Numerical Solution of Differential Equations" Wiley Eastern 1979.

Advanced Microprocessor & Embedded Systems EC-204

Course Code	EC-204		L-3,T-1,P-0
Name of the Course	Advanced Microprocessor & Embedded Systems		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Microprocessor Architectural Concepts

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

UNIT – II

Microprocessor Instructions And Communications & Microprocessor I/O Data Communication, Instruction Set, Mnemonics, Basic Instruction Types, Addressing Modes, Interfacing I/O, Microprocessor, Polling and Interrupts, Interrupts and DMA. Microprocessor I/O Data communication, Parallel I/O Serial Communication, Serial Interface and UART, Modem, I/O Devices, D/A & A/D Interface, Interface, Special I/O Devices.

UNIT – III

Introduction to Embedded System & Microcontrollers:

Their classification & characteristics, Concepts and Processes of system level design of embedded system. Introduction to microcontrollers, Memory , Buses, Direct Memory Access , Interrupts, Microprocessor Architecture, Interrupt Basic, Shared Data Problems, Interrupt Latency, PIC 16F8XX Flash Microcontrollers, CPU architecture, Register file structure, Instruction Set, Programs, Timers and Interrupts, Interrupt Service Routine , Features of Interrupts, Interrupt vector & Priority, Timing Generation & Measurements, Interfacing Methods, I/O Interface, LCD interfacing, Seven segment interfacing, I^2C Bus, DAC, ADC, UART.

UNIT – IV

Program Modeling Concepts in Single and multiprocessor system Software- Development Process: Modeling Processes for software Analysis before software implementation, Program model for event controlled, Modeling of Multiprocessor Systems.

UNIT – V

Embedded Core Based Design & Real Time programming and Operating System (RTOS)

System -on -Chip, Application specific Integrated circuit, Overview of Embedded Processors like ARM, MIPS and Intel MMX series, Architecture, Organization and instruction set, Memory management, High level logic synthesis. Data parallel issues e.g SIMD, MIMD, MISD, SISD. Introduction to FPGA, Basics of FPGA,RTOS Overview, Basics of RT- Linux as a RTOS, Assembly language, C++

Text Books:

1. 8086 microprocessor & Architecture by Liu, Gibson; PHI.
2. Embedded Microprocessor System Design by Kenneth L. Short, Pearson Education.
3. Embedded system Design by Steve Heath

Reference Books:

1. Embedded Controllers by Berry B. Bray Pearson Education.
2. Microcontrollers (Theory and Applications)- Ajay V. Deshmukh

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Reliability of Electronics & Communication Systems EC-205

Course Code	EC-205		L-3,T-1,P-0
Name of the Course	Reliability of Electronics & Communication Systems		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Concept of reliability

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

UNIT – II

Reliability Data and Analysis Data sources.

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

UNIT – III

System Reliability and Modeling

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

UNIT – IV

Maintainability and Availability

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

UNIT – V

Life Testing of Equipments & Value Engineering

Non-destructive tests, destruction tests and their Mathematic modeling. Quality and Reliability, Measurement & prediction of Human Reliability, Reliability and safety, safety margins in critical Devices, case studies. Techniques in value Engg; Structure of value Engg. Reliability Management.

Text Books:

1. Reliability Engg. By Govil, 1992.
2. Reliability Engg. By Dr.A.K.Aggarwal, 1992.

Reference Books:

1. Related IEEE/IEE publications

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ADVANCED ANTENNA SYSTEMS **EC-206**

Course Code	EC-206		L-3,T-1,P-0
Name of the Course	ADVANCED ANTENNA SYSTEMS		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Review of vector potentials & antenna parameters. Linear antennas viz. λ/2 & λ/4(Input impedance, far fields, radiation resistance, directivity and efficiency). Antenna array (different types, discussion on binomial & Dolph- Tschebysheff array), Super directivity (Efficiency & directivity), design considerations.

UNIT – II

Antenna Synthesis and continuous sources (Line-source, Discretization of continuous sources), Schelkunoff polynomial method, Fourier transform method, Taylor Line-source, Triangular, cosine and cosine-squared amplitude distributions, continuous aperture.

UNIT – III

Broad-band antennas & Different antenna (Bi-conical, Sleeve Dipole, Cylindrical dipole, rhombic antenna, helical antenna, Yagi-Uda array), Frequency Independent antenna (planar and conical spiral, log periodic). (Field equivalence principle) Radiation equations, Directivity, Rectangular and Circular aperture (Radiation from apertures and distribution), Horn antenna (E-plane, H-plane, Corrugated, Di-electric loaded-field & directivity calculation).

UNIT – IV

Micro-strip antenna & Antenna fabrication techniques: Basic characteristics, Rectangular and Circular patches, Transmission line and cavity model, Feeding techniques and recent advancement. (Linear, Horn & Microstrip patch), Measurements (Impedance, Gain, polarization and Radiation pattern). Matching techniques. Antenna ranges.

UNIT – V

Smart Antenna, Review of radar & Simulation Software (Principle, Block diagram), Design considerations and recent development. range equation (using all parameters), Radar Signal Integration, Range Accuracy and Resolution, Signal detection and estimation, Clutter and noise suppression. Simulation Software based discussion of antenna and radar (Design and Calculation).

Books Recommended:

1. C.A Balanis, Antenna Theory-Analysis, John Wiley
2. J.D.Karus- Antenna, McGraw Hill

Reference Books

1. Microstrip Antennas-I.J.Bahl P.Bhartia Artech house
2. M.I.Skolnik-Introduction to Radar System, McGraw Hill

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Peripheral System Design & Interfacing **EC-207**

Course Code	**EC-207**		L-3,T-1,P-0
Name of the Course	**Peripheral System Design & Interfacing**		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		Max. Marks: 50	

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Bus system & Interface

Bus systems in microcomputers ST 100 bus, Multi bus, EISA, PCI Bus, HP IB/GPIB Bus, Bus and their applications. I/O, Standard I/O interfaces RS-232 C, RS-232 D Centronics interface, current loop Interface and RS-449 communication interface.

UNIT – II

Design criterion with PCs

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

UNIT – III

Peripherals

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

UNIT – IV

Controllers

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

UNIT – V

Development tools

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

Text Books:

1. Intelligent Instrumentation by George C. Barney, PHI.

2. Student Reference Manual For Electronics Instrumentation Labs by Stanley wolf and Richard F.M. Smith, PHI.

3. Instrumentation for Engg. Measurement by James W. dally, William F. Riley, John Wilay and Sons

Reference Books:

1.Interfacing A Laboratory Approach by Deonzo, PHI

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Modeling & Simulation of Communication Systems EC-208

Course Code	EC-208		L-3,T-1,P-0
Name of the Course	Modeling & Simulation of Communication Systems		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Introduction & Random Number

Concept of Simulation, System, Model, Types of Model, Univariat & Multi variat Models, Deterministic & Stochastic models, Continuous & Discreet Models, Analog & Digital Simulation, Real Time Simulation, Hybrid Simulation, Advantages & Limitations of Simulation, Steps in Simulation Study Pseudo Random Numbers, Generation of random numbers, properties & testing of random numbers, generation of random variables using common distributions, Bounds and approximations of Random processes.

UNIT – II

Review of signals and systems,

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

UNIT – III

Modeling of communication system

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

UNIT – IV

Simulation and modeling methodology

Simulation environment, Modeling consideration, Performance evaluation techniques, Error sources in simulation, design of simulation experiment – length of run, replication, elimination of initial bias, variance reduction techniques.

UNIT- V

PSpice Simulation of analog systems using PSpice & Case studies

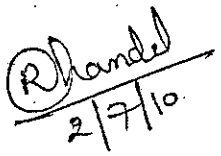
Case study of 64-QAM equalized digital radio link in a fading environment and satellite system.

<u>Books Recommended:</u>

1. Simulation of Communication Systems by M.C. Jeruchim & Others, Plenum Press.
2. Modern Digital and Communication Systems by Lathi B.P.

<u>Reference Books:</u>

1. System Simulation – by DS Hira
2. Discreet Event System Simulation – by Banks, Carsen, Nelson, Persian Edu. Asia.
3. Related IEEE/IEE publications



Microwave Theory and Techniques **EC-209**

Course Code	**EC-209**		L-3,T-1,P-0
Name of the Course	**Microwave Theory and Techniques**		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		Max. Marks: 50	

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Electromagnetic Waves

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

UNIT – II

Transmission Lines

Matrix Representation of network: The impedance matrix, The admittance matrix, The Cascade matrix, Transmission line parameters, Telegraphists' equations. The Propagation of Waves on Transmission Lines: The wave equation, Solution of wave equations, Characteristics impedance and characteristics admittance, Power, Terminated lines, Short circuited line, Open Circuited Line, Lumped-Element Equivalents of Lines. Transmission: Line Application & Techniques; The Quarter-wave Transformer, Stub Matching, Binomial Matching, Line Connections, The Parallel-Plate Line, The Coaxial Line, Application of Conformal Mapping, The strip transmission Line.

UNIT – III

Elementary Theory of Wave guides

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

UNIT – IV

Microwave components

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

UNIT – V

Introduction to monolithic microwave integrated Circuits

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

Text Book Recommended:

1. Field Theory of guided waves by R.E.Collin

Reference Books:

1. Theory of Guided Electromagnetic waves by R.A. Waldron

2. Microwave Propagation & Techniques by D.C. Sarkar

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Lab-II

EC-210

Course Code	**EC-210**		P-3
Name of the Course	**Lab-II**		
Lab Session	26Hrs		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for Sessional (based on Lab work 30%, Lab Record 25%, Viva 25%, Attendance 20%)		Max. Marks: 50	

LIST OF EXPRIMENT

1. (a) To study fiber optic transmitter.
   (b) To study fiber optics detector.
2. (a) To study simplex fiber optic link.
   (b) To study duplex fiber optics link.
3. (a) To study digital Trans receiver.
   (b) To study fiber optic LED.
4. (a) To study losses in optical fiber.
5. To determine numerical aperture of optical fiber in Step Index & multi mode optical fiber.
6. (a) To study transmission of an audio signal through an optical fiber.
   (b) To study fiber optics hybrid modulate for analog transmission modules for transmitter and Receiver.
7. Write VHDL programmers for:-
   1. Multiplexer
   2. De multiplexer
   3. Decoder and Encoder
8. Write down VHDL programmes for
   (a) Register.
   (b) Code converter
   (c) Shift register.
9. Implement the above circuits on CPLD/FPGA kits.
10. Design 8-bit ALU using VHDL and implement it on CPLD/FPGA kit.
11. Design a frequency meter (10 MHz) using VHDL and implement it on FPGA.

Books Recommended

1. J. Bhaskar, " A VHDL Primer", Addison Wesley, 1999
2. J.F. Wakerly, "Digital Design-Principles and Practices", PHL
3. Z. Navabi, " VHDL-Analysis and Modeling of Digital Systems", MGH

:* **Software Used:** XILINX, Or-CAD, MATLAB, (latest version)

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COMPUTER COMMUNICATION NETWORKS **EC-303**

Course Code	EC-303		L-3,T-1,P-0
Name of the Course	COMPUTER COMMUNICATION NETWORKS		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT 1

.Introduction Of Computer Communication Network & Queuing Models

Introduction to Network models-ISO-OSI, SNA, Appletalk and TCP/IP models, Fundamentals of digital communication, channel capacity, bit error rate, media characteristics, FDM, TDM, CDMA, statistical multiplexing, point to point and broadcast communication ,Poisson Process, Markov chain, M/M/1 Queue- delay and little's formula, M/M/S/K Queues – average queue length, delay and waiting times, M/G/1 Queues

UNIT – II

Data link protocols & Network layer

Stop and wait protocols and Sliding window protocols - - performance and efficiency. Verification of protocols using Finite State Machines. Multi access protocols – ALOHA and CSMA and its variations. IEEE models and protocols- 802.3,802.4,802.5 and DQDB, Adhoc networks. Design issues for VC and datagram. Routing algorithms- Dijsktra's , Bellman-Ford, Flooding and broadcasting, link state routing, Flow and congestion control, internetworking, internet architecture and addressing

UNIT – III

Transport layer , Session and presentation layer

Design issues, Connection management, Elements of TCP/IP protocol, Finite state machine model. Dialog management, synchronization and session primitives, presentation concepts, cryptography – DES, DES chaining, AES, Public key methods, MD5. Secure Socket layer.

UNIT – IV

Application layer , ATM and B-ISDN

SNMP, SMTP, RMON, DNS, email service, MIME and WWW ,Introduction to ATM, ATM layers and applications, ATM over IP, narrowband and broadband ISDN

UNIT –V

Case study

Study of various network simulators, Network performance analysis using NS2

Text Books:

1. Andrew S. Tanenbaum " Computer Networks" by Pearson Education, fourth edition.
2. Bertsekas and Gallagher "Data Networks" by Prentice hall, Second Edition

References:

1. William Stallings " Data and Computer Communication" , by Prentice hall, Seventh edition
2. William Stallings " Cryptography and Network security" by PHI, Third edition
3. Fred Halsall " Data Communications, Computer Networks and Open Systems" by Pearson Education, Fourth edition
4. William Shay " Understanding data Communication and Networks" by Thomson press Second edition

Digital Signal Processing EC-304

Course Code	EC-304		L-3,T-1,P-0
Name of the Course	**Digital Signal Processing**		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Discrete time signals and systems:

Discrete time signals and systems, Z-transforms, structures for digital filters, design procedures for FIR and IIR filters. Frequency transformations: linear phase design; DFT. Methods for computing FFT. Noise analysis of digital filters, power spectrum estimation.

UNIT – II

Signals and signal Processing: characterization & classification of signals

Signals and signal Processing: characterization & classification of signals, typical Signal Processing operations, example of typical Signals, typical Signals Processing applications. Time Domain Representation of Signals & Systems: Discrete Time Signals, Operations on Sequences, the sampling process, Discrete-Time systems, Time-Domain characterization of LTI Discrete-Time systems, state-space representation of LTI Discrete-Time systems, random signals.Transform-Domain Representation of Signals: the Discrete-Time Fourier Transform, Discrete Fourier Transform, DFT properties, computation of the DFT of real sequences, Linear Convolution using the DFT. Z-transforms, Inverse z-transform, properties of z-transform, transform domain representations of random signals.

UNIT – III

Transform-Domain Representation of LTI Systems

Transform-Domain Representation of LTI Systems: the frequency response, the transfer function, types of transfer function, minimum-phase and maximum-Phase transfer functions, complementary transfer functions, Discrete-Time processing of random signals.

UNIT – IV

Digital Processing of Continuous-Time Signals

Digital Processing of Continuous-Time Signals : sampling of Continuous Signals, Analog Filter Design, Anti-aliasing Filter Design, Sample-and-hold circuits, A/D & D/A converter, Reconstruction Filter Design.

UNIT – V

Digital Filter Structure & Design:

Digital Filter Structure: Block Diagram representation, Signal Flow Graph Representation, Equivalent Structures, bone FIR Digital Filter Structures, IIR Filter Structures, State-space structure, all pass filters, tunable IIR Digital filters. Cascaded Lattice realization of IIR and FIR filters, parallel all pass realization of IIR transfer function, Digital Sine-Cosine generator. Digital Filter Design: Impulse invariance method of IIR filter design, Bilinear Transform method of IIR Filter Design, Design of Digital IIR notch filters, FIR filter Design based on truncated fanner sans, FIR filter design based on Frequency Sampling approach.

Text / Reference:

1. Sanjit K. Mitra, "Applications DSP a Computer based approach" , TMH.
2. Allan Y. Oppenhein & Ronald W. Schater , "Digital Signal Processing", PHI

References:

1. Monson H. Hayes, " Schaum's Outline of Digital Signal Processing", Mcgraw Hill, 1999.
2. Richard W. Hammming, "Digital Filters", Dover Pubns, 1998.

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INFORMATION SECURITY **EC-305**

Course Code	**EC-305**		L-3,T-1,P-0
Name of the Course	**INFORMATION SECURITY**		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		Max. Marks: 50	

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Introduction &. Cryptographic Techniques -

Introduction to OSI Network Security Architectures, Services, Mechanisms and Attacks, Classical Encryption Techniques, Symmetric cipher model, Substitution techniques, Transposition techniques, Rotor Machines, Steganography. An overview of Cryptology, Primarily test, *Perfect* security, Stream Cipher *Stream ciphers:* The one time pad. Pseudo-random key streams - properties and generation. Block Cipher -, Introduction to DES, differential and Linear Cryptanalysis, Block Cipher Cryptography, Triple DES Algorithm, International Data Encryption Algorithm (IDEA), Blowfish Algorithm, RC-x Algorithms, CAST-x Algorithms, Symmetric Block Cipher Schemes, Encryption Function Placement and Confidentiality problems. Cryptographic hash functions, Digital signatures,

UNIT – II

Public-Key Cryptography and Message Authentication

The Key Distribution Problem, Random Number Generation, The Public-Key Cryptosystems, The RSA Algorithm, The Key Management riddle, The Diffie-Hellman Key Exchange, Elliptic Curve Cryptography. Introduction to Message Authentication, requirements and functions, Message Authentication Codes, Hash Functions, their Security and other considerations

UNIT - III Authentication Applications

The Message Digest (MD5) Algorithm, The Secure Hash Algorithm (SHA-1), RIPEMD-x and HMAC fundamentals, Digital Signature basics, Authentication Protocols, The Digital Signature Standard, Introduction to the Kerberos Authentication scheme, The X.319 Directory Authentication scheme.

UNIT – IV

Systems and Applications Security - Authentication, Access control policies, Mail security, PGP, Data (base) security, File system security, Program security, Memory security, Session security, SSH, Web security, Web applications security, Sandboxing, Linux security , Windows 2000.

UNIT – V

Security Protocols Intrusion detection

Security properties, attacks, Design of a security protocol, Examples of security protocols, Contract signing protocols, Formal models of protocols and detecting leaks, Electronic voting protocols, IPSec,, SSL, TLS worms and viruses, micro payments, smart card security, Security of wired / wireless networks Key Management in Group Communication Systems, Router security, Denial of service and side-channel attacks, Intrusion Detection Systems, Intrusion detection techniques - centralized and distributed;

Books Recommended:

1. William Stallings, Cryptography and Network Security: Principles and Practice, Third Edition, Pearson Education, New Delhi

References

1. Kaufman, R. Perlman and M. Spenser, Network Security, Second Edition, Prentice-Hall, Englewood Cliffs.
2. S. Bellovin and W. Chesvick, Internet Security and Firewalls, Second Edition, Addison-Wesley, Reading,

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ADVANCED MATHEMATICS

EC-306

Course Code	EC-306		L-3,T-1,P-0
Name of the Course	ADVANCED MATHEMATICS		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		Max. Marks: 50	

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT - I

Series solution of differential equations, Power series methods, Legendre's polynomial, Generating functions, Recurrence relations. Frohenius method, Series solution of Bessel's differential equation, Modified Bessel's functions, Generating functions, Recurrence relations.

UNIT - II

Equations reducible to Bessel's equation. Sturm Liouville's problem, orthogonal functions, Orthogonality of eigen functions, Eigen function expansions.

UNIT - III

Conformal mapping, Exponential function ,Trigonometric functions, Hyperbolic functions, Inverse trigonometric functions, Logarithmic function, Power function, Bilinear and Schwarz-Christoffel transformation, Applications to engineering problems.

UNIT - IV

Matrices, Functions of square matrices, Quadratic and Hermitian forms, Solution of linear simultaneous equations by Gaussian elimination and its modifications

UNIT –V

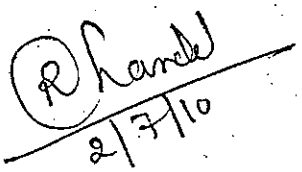
Crout's triangularization method, Iterative method's-Jacobi's method, Gauss-Seidel method, Eigen value by iteration. System simulation, Technique of simulation, Monte Carlo method, Comparison and simulation with analytical method, Numerical computation techniques.

Text Books:

1. Advanced Engineering Mathematics, Wylie and Barren, Mcgrawhill,6th edition,1995
2. Higher Engineering Mathematics, B.S. Grewal, Khanna Publications

Reference Books

1. Narsingh Deo, System Simulation with Digital Computer, Prentice Hall of India
3. Advanced Engineering Mathematics, Kreyszig, John Wiley and Sons,8th edition,2001
4. Geoffrey Gordon System Simulation, Prentice Hall of India
5. Engineering Mathematics, Bali &Iyingar, Laxmi Publication.



CMOS VLSI Design **EC - 307**

Course Code	EC-307		L-3,T-1,P-0
Name of the Course	CMOS VLSI Design		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		Max. Marks: 50	

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Introduction of MOS transistor & The MOS Inverter

Basic principle of MOS transistor. Introduction to large signal MOS models (long channel) for digital design.Inverter principle, Depletion and enhancement load inverters, the basic CMOS inverter, transfer characteristics, logic threshold. Noise margins, and Dynamic behavior, Propagation Delay, Power Consumption.

UNIT – II

MOS Circuit Layout , Simulation & Combinational MOS Logic Design

MOS SPICE model, device characterization. Circuit characterization, interconnects simulation. MOS device layout: Transistor layout, Inverter layout, CMOS digital circuits layout & simulation

Static MOS design: Complementary MOS. Ratioed logic. Pass Transistor logic, complex logic circuits.

UNIT III

Dynamic MOS design & Sequential MOS Logic Design

Dynamic logic families and performances.Static latches, Flip flops & Registers, Dynamic Latches & Registers, CMOS Schmitt trigger. Monostable sequential Circuits, Astable Circuits. Memory Design: ROM & RAM cells design

UNIT IV

Interconnect & Clock Distribution

Interconnect delays. Cross Talks. Clock Distribution. Introduction to low power design, Input and Output Interface circuits.

UNIT V

BiCMOS Logic Circuits

Introduction, BJT Structure & operation. Basic BiCMOS Circuit behavior, Switching Delay in BiCMOS Logic circuits. BiCMOS Applications

Textbooks

1. Kang & Leblebici "CMOS Digital IC Circuit Analysis & Design"- McGraw Hill, 2003
2. Rabey. "Digital Integrated Circuits Design", Pearson Education, Second Edition, 2003

Reference book:

1. Weste and Eshraghian, "Principles of CMOS VLSI design" Addison-Wesley, 2002

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Design of VLSI System

EC - 308

Course Code	EC-308		L-3,T-1,P-0
Name of the Course	Design of VLSI Systems		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

VLSI System Design methodology & Chip Design Methods & Design capture tools:
Structure Design. Strategy. Hierarchy, Regularity. Modularity, Locality. System on Chip Design options: Programmable logic and structures. Programmable interconnect, programmable gate arrays, Sea of gate and gate array design. standard cell design, full custom mask design.Behavioral synthesis, RTL synthesis, Logic optimization and structural tools layout synthesis, layout synthesis, EDA Tools for System HDL Design. Schematic Design, Layout Design, Floor planning and Chip Composition. Design Verification Tools: Simulation Timing Verifiers, Net List Comparison Layout Extraction, Design Rule Verification.

UNIT – II

Data Path Sub System Design & Array Subsystem Design Control Unit Design
Introduction. Addition, Subtraction, Comparators, Counters, Boolean logical operations, coding, shifters, Multiplication. Parallel Prefix computations.SRAM, Special purpose RAMs, DRAM, Read only memory, Content Addressable memory, Programmable logic arrays. Finite State Machine (FSM) Design, Control Logic Implementation: PLA control implementation, ROM control implementation.

UNIT – III

VLSI automation Algorithms:
Partitioning: problem formulation. classification of partitioning algorithms, Group migration algorithms, simulated annealing & evolution. other partitioning algorithms.

UNIT – IV

Placement, floor planning & pin assignment & Global Routing: problem formulation, simulation base placement algorithms. other placement algorithms, constraint based floor plannning, floor planning algorithms for mixed block & cell design. General & channel pin assignment.Problem formulation, classification of global routing algorithms, Maze routing algorithm, line probe algorithm, Steiner Tree based algorithms. ILP based approaches

UNIT –V

Detailed routing & Over the cell routing & via minimization
Problem formulation. classification of routing algorithms, single layer routing algorithms, two layer channel routing algorithms, three layer channel routing algorithms, and switchbox routing algorithms. two layers over the cell routers, constrained & unconstrained via minimization Compaction: problem formulation, one-dimensional compaction, two dimension based compaction, hierarchical compaction

Text Books:

1. Neil H.E. Weste. Davir Harris. "CMOS VLSI Design: A Circuits and system perspectives" Pearson Education 3rd Edition.
2. Naveed Shervani. "Algorithms for VLSI physical design Automation", Kluwer Academic Publisher. Second edition

Reference Books:

1. Wayne. Walf. "Modern VLSI design: System on Silicon" Pearson Education, Second Edition
2. Pucknull, "Basic VLSI Design" PHI 3rd Edition

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Microwave & Optoelectronic Device **EC - 309**

Course Code	**EC-309**		L-3,T-1,P-0
Name of the Course	**Microwave & Optoelectronic Device**		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT - I

Microwave frequencies, microwave transistor, microwave field effect transistor, tunnel diode, backward diode, and MIS tunnel diode, Transferred electron devices-Gunn Diode, Avalanche Transit Time Devices: IMPATT Diode, BARRITT Diode, DOVETT Diode, and TRAPATT Diode

UNIT - II

Microwave Integrated Circuit: Introduction, Circuit Forms, Transmission lines for MICs, Lumped Elements for MICs, Material for MICs: Substrate, Conductor, dielectric and resistive Materials, Fabrication techniques, Typical example of fabrication, Hybrid fabrication.

UNIT - III

Microwave tubes: Klystron, Reflex Klystron and Magnetron, Traveling wave tubes, microwave detection diodes, application of microwave

UNIT - IV

Introduction of optoelectronic devices: Photovoltaic devices, Solar Radiation, PN-Homojunction solar cells, Antireflection coatings, Ideal conversion efficiency, Spectral response, I-V Characteristics, Temperature and radiation effects, Heterojunction solar cells, Schottky barrier solar cell, Thin film and amorphous silicon solar cell, Solar arrays

UNIT - V

Display devices: Characterization of displays, drawbacks of cathode ray tube, Flat panel display: Electro luminescence displays (Powder and thin films), Plasma display, LCD, Electronchromic display and electrophoresis display

Text Books:

1. Physics of Semiconductor Devices by S M Sze, Willy Eastern Pub.
2. Microwave Devices and Circuits by S. Y. Liao, PHI

Reference Books:

1. Microwave Engineering and application by O.P. Gandhi, Maxwell Macmillan Pub.
2. Topic in applied physics – Vol 40 by J.I. Pankove, Springer Verlag
3. Microelectronic Devices by E. S . Yang, MGH
4. Semiconductor Devices and Integrated Electronics by A. G. Milness, CBS Pub.
5. Opto electronics: An introduction by J. Wilson & JFB Hawkers, PHI

PLCs AND SCADA **EC - 310**

Course Code	**EC-310**		L-3,T-1,P-0
Name of the Course	**PLCs AND SCADA**		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Introduction:

Fundamental Control Concepts, PLC System, CPU-Architecture, Programmers and Monitors, PLC Input and Output Modules-Analog and Digital, power Supply of PLCs, Internal Timers, Counters, and Flags. Criteria for Selection of PLC, PLC vs. PC. Memory requirements.

UNIT – II

SCADA:

Architecture, Potential benefits of SCADA. Introduction to SCDA software (RS VIEW-32)Project Creation, Alarming, Data Logging, Trending, Object keys, Derived Tags Event Generation, Macros, Object Linking & Embedding, Security, PLC based SCADA Systems.

UNIT – III

Programming Procedures:

Different programming formats like ladder diagram, statement list, Boolean etc. Programming based on ladder diagrams using relay, timer's counters sequencers, and data transfer, comparison, arithmetic,

UNIT – IV

logical instructions & software flags:

logical instructions & software flags, Programming equipments like computer, hand-held programmer, on-board programming, Human machine interface, Program Scanning, Proximity Sensors and their connection to PLC, PLC as PID Controller.

UNIT – V

NETWORKING:

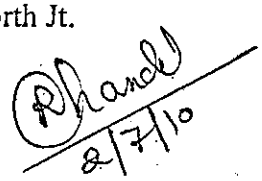
Networking of PLCs, Types of Networking, and Cell control by PLCs.

Text Books:

1. Introduction to Programmable Logic Controllers by Gray Dunmig, Boston, Delmar

Reference Books:

1. Manuals on PLCs by Siemens/Allen Bradley
2. Programming Logic Controllers by Hackworth and Hackworth Jt.



Neural Networks & Fuzzy Logics **EC - 311**

Course Code	EC-311		L-3,T-1,P-0
Name of the Course	Neural Networks & Fuzzy Logics		
Lectures to be delivered	52(1 Hr Each) (L = 39, T =13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 50
Continuous Assessment for sessional (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	Max. Marks: 50		

Note: *Eight questions of equal marks to be set covering the whole syllabus and any five to be attempted.*

UNIT – I

Introduction:

History, overview of biological Neuro-System, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning.

UNIT- -II

Supervised Learning and Neurodynamics:

Perceptron training rules, Delta, Back propagation training algorithm, Hopfield Networks, Associative Memories.

UNIT - III

Unsupervised and Hybrid Learning:

Principal Component Analysis, Self-organizing Feature Maps, ART networks, LVQ,

UNIT - IV

Applications of Neural Networks

Applications of Artificial Neural Networks to Function Approximation, Regression, Classification, Blind Source Separation, Time Series and Forecasting. VLSI implementations of Neural Networks

UNIT – V

Fuzzy Logic

Basic concepts of Fuzzy logic, Fuzzy Vs Crisp set, Linguistics Variables, Memberships Functions Operation of fuzzy sets, Fuzzy IF – THEN rules, Variable inference Techniques, De Fuzzyfication , Basic Fuzzy inference algorithms, Fuzzy System Design, FKVC & PID controls, anti-lock breaking system(ABS), Industrial applications,

Text Books:

1. Anderson J.A., "An Introduction to Neural Networks", PHI, 1999.

Reference Books:

1. Haykin S., "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
2. Freeman J.A., D.M. Skapura, "Neural Networks: Algorithms, Applications and Programming Techniques", Addison-Wesley, Reading, Mass, (1992).
3. Golden R.M., "Mathematical Methods for Neural Network Analysis and Design", MIT Press, Cambridge, MA, 1996.
4. Cherkassky V., F. Kulier, "Learning from Data-Concepts, Theory and Methods", John Wiley, New York, 1998.
5. Anderson J.A., E. Rosenfield, "Neurocomputing: Foundatiions of Research, MIT Press, Cambridge, MA, 1988.

2/7/10

DISSERTATION GUIDELINES

DISSERTATION GUIDELINES FOR M.TECH IN ELECTRONICS & COMMUNICATION ENGINEERING

1. ELIGIBILITY

Students are required to submit a dissertation to complete the requirements for awarding **M.Tech in Electronics & Communication Engineering.** A Student can take up submission of his / her dissertation only after he / she has completed 1, 2 and 3 semester and obtained at least 50% marks in aggregate. If, a Student fails to get 50 % in aggregate he / she will have to repeat the semester or subject in which he / she wants to improve.

Guidelines for selection of the topic of dissertation work, preparation and submission of dissertation are presented below.

2. APPROVAL

Student should obtain approval of the examination committee for his choice of the guide and topic for the dissertation work before undertaking the detailed dissertation work. Application in this regard should be made in the prescribed form, together with a brief write up in 300 / 500 words of the topic of the dissertation prepared to be under taken and should contain concise summary of essential features of the dissertation work, and should contain Purpose, General Methods and Steps to be followed, apparatus / equipment to be used, engineering techniques and practice employed, expected results and conclusion(s) arising out of the dissertation work .

Student should note that the dissertation work must be relevant to Electronics & Communication Engineering or related fields in engineering profession, in which he / she is trained. A prior approval from the competent authority is mandatory before proceeding to undertake the work in the prescribed form appended as annexure I

3. SCOPE

The dissertation should demonstrate the ability of Student to apply the techniques of Engineering Science & Technology they have learnt /observed during their course of study for examination to specific situation or any functional area. The area chosen may be one or more of the areas in which papers are prescribed for 1, 2 and 3 semester examination or the area(s) from which Student have chosen their elective papers for 1, 2 and 3 semester examination.

The dissertation should demonstrate the research ability of the Student for data collection, analysis of data collected, formulation of recommendations and for suggesting a viable scheme for implementation of his recommendations.

The data should be collected either by his own observations and measurement or gathered from generally accepted valid first source(s) like performance report from production, etc if general data are used industry wise or nations based, then sources shall be quoted and should be generally from accepted source like industry publication, Government gadgets etc. All the steps of the analysis of data and relevant theory shall be included in the dissertation.

While formulating recommendations with expected costs and benefits, advantages and disadvantage of recommendation shall be clearly discussed. The suggested scheme for implementation of recommendation should be clearly and logically laid out with all details of the steps involved of time schedules for implementing steps. Precautions are to be observed and monitored. A synopsis has also to be submitted along with the dissertation.

4. DISSERTATION CONTENTS:

The dissertation has three basic parts: the preliminary pages, the text and the reference materials. The preliminary materials consist of the Top cover page, Two blank pages, Inside cover page, Dedication page (Optional), Student's declaration / Bonafide Certificate, Certificate from the Supervisor, Acknowledgements, Abstract, Table of Contents, List of Tables, List of Figures, List of Symbols, Abbreviations or Nomenclature (Optional) and other lists. Preliminary pages are paginated separately from the rest of the text.

After that Chapters, References, Appendices, List of papers published as a part of dissertation work and Brief curriculum vitae is to be included. The dissertation shall be presented in a number of chapters, starting with Introduction and ending with Conclusions. Each of the other chapters will have precise title reflecting the contents of the chapter. A chapter can be subdivided into sections, sub- sections and sub sub-section so as to present the content discretely and with due emphasis. Each chapter shall begin on a fresh page.

The dissertation work should be done under the guidance of a faculty member of the institution. A certificate from the guide should be submitted as per Performa given below after receiving declaration from the Student as appended below in annexure II and the declaration certificate and Acknowledgement should be bound along with other contents of the dissertation.

5 LIST OF TABLES

i. The contents shall be followed by a list of table indicating the table number, Table title and the corresponding page number. The table number shall be in decimal notation indicating the chapter number and the table number in that chapter.
ii. Any reference within the text shall be given by quoting the relevant number for eg. Table 2.2
iii. The table number should be mentioned at the top of the table centrally aligned and be bold.

6 LIST OF FIGURES

i. The list of figures shall follow the list of tables indicating the figure numbers, Figures titles and the corresponding page number. The figure shall be in decimal notation indicating the chapter number and the figure number in the chapter. For e.g. 6.4 refers to fig. 4 in chapter 6
ii. Any reference within the text shall be given by quoting the relevant number, e.g. Fig. 4.6
iii. The fig number should be mentioned at the bottom of the fig centrally aligned and be bold.

7. NOMENCLATURE

The 'Nomenclature' follows the 'List of figure' and contains the list of symbols used. They shall be arranged alphabetically in order of Latin Letters, superscripts and subscripts. As far as possible generally accepted symbols shall be used. Symbols not available in keyboard shall be written in permanent black ink.

8 PAGE NUMBERING

i. For items from Student's declaration to Nomenclature the page number shall be in big roman letters of 12mm size, Appendices should be given at the end of the dissertation on small roman at 12mm from the bottom of the page centrally located.

ii. Page numbers in Arabic numerals shall start with 2 on second page of the introduction chapter. There shall be no numbering of pages on which new chapter begin. The number shall be suitably placed at the bottom, centrally located, all pages.

9 CHAPTER NUMBERING

The chapter shall be numbered in Arabic numerals, section and sub-section of any chapter shall be in decimal notation, all chapters shall begin on a new page. The title for chapters, sections, and sub-sections shall be properly centered at the top of the page and have three spaces between them including the chapter number and should be typed in block capitals

10. CHAPTERS

I. **CHAPTER 1: INTROUCTION** The introduction shall form chapter 1.It shall highlight the importance of need for investigation and also define and name topic and scope of work envisaged.

II. **CHAPTER 2: REVIEW OF LITERATURE:** This shall form chapter II it shall present a critical appraisal of the previous work done on the topic. The extent of emphasis shall depend upon the nature of investigation.

i. Each chapter may have several sections and sub-sections with sub titles.
ii. Each chapter shall present important a short deviations and representatives data in table and figures. Information such as lengthy derivations, voluminous tables and large number of figures shall be presented in appendices.

III. CHAPTER 3 : METHODOLOGY OF WORK DONE

i.The work carried out shall be presented in one or more chapters depending upon nature of investigations. Each chapter shall have suitable title, eg.

a) THEORETICAL WORK
b) EXPERIMENTAL INVESTIGATION
c) RESULT OBTAINED etc.

ii.Figures and tables shall be on separate sheets and not inserted in pages with running text. Illustrations shall be in colour print, if distinguished by colour. Depending on size, figures and tables shall be accommodated in print size.

iii.If there are longer tables that can not be accommodated on these sheets, there shall be a continuation table. Very large figures shall be placed in a pouch at the end of the dissertation. All figures and tables shall be mentioned in the text and should be so numbered that each one can be placed as close as possible, to the passage in the text, where it is mentioned first.

iv.The figures and tables included in the appendices shall be accordingly mentioned in the text. Lettering on figures shall be uniform either in engineering letters or typed. Each figure and table may follow its first mention in the text and not precede it. The figures should be self-sufficient to provide all the information. There must be a title for every figure and table.

v.Mathematical portion of the text shall be preferably typed. What it is not possible, ample space shall be left, and equations and symbols shall be inserted clearly in permanent black ink.

IV. CHAPTER 4 : DISCUSSION AND CONCLUSIONS

Discussion and Conclusion shall be recorded in last chapter of the dissertation. They shall include a thorough evaluation of the investigation carried out and shall bring out Student's own contribution, if any. The discussion shall logically lead to certain conclusions and inferences. A suggested scheme of implementation should also be included. Scope for future work should also be stated lucidly in the last part of the Chapter.

V. REFERENCES

References shall follow the last chapter. It shall include a list of works (paper, books etc) referred in the body of the text and they shall be arranged in the order they are first cited in the text.

i. For any paper the information shall contain the name of the authors, year of publication, the title of the journals, the volume number and the page number in parenthesis.
ii. In the case of references from the journals and books in languages other than English the titles of the journals or books should be transliterated into Latin script and not translated.
iii. For any book the information shall contain the names of authors, year of publication, the title of the book, the name and the publisher and edition in parenthesis.
iv. For paper and books with joint authorship, the names of all authors shall be reproduced in same order. The author's name shall begin with surname followed by initials.

However, Students are advised to follow the APA latest edition style for preparing the dissertation, for which the complete rules are available at http://www.apa.org.

Some sample references have been produced here for information purpose only

Sample References in Modified APA Format

Books

American Psychological Association. (2010). Publication manual of the American Psychological Association (6th Ed.). Washington, DC:

Author wise.

Gliner, J. A., Morgan, G. A., & Leech, N. A. (2009). Research design and analysis in applied settings: An integrated approach. (2nd ed.) New York, NY: Routledge / Taylor and Francis.
Morgan, G. A., Leech, N. A., Gloeckner, G., & Barrett K. A., (2007). SPSS for introductory statistics: Use and interpretation. Mahwah, NJ: Erlbaum.

Dissertations

Tungate, S. L. (2008). Welfare and child welfare collaboration. Available from ProQuest Dissertation and Theses data base (publication number AAT 3346472).

Periodicals and Journals

Herbst-Damm, K. L., & Kulik, J. A. (2005). Volunteer support, marital status, and the survival times of terminally ill patients. Health Psychology, 24, pp. 225-229. Doi:10.1037/0278-6133.24.2.225

Technical and Research Reports

American Psychological Association, Task Force on the Sexualization of Girls. (2007). Report of the APA Task Force on the Sexualization of Girls. Retrieved from http://www.apa.org/pi/wpo/sexualization.html 5 6

Meetings and Symposia

Matheson, J., Gloeckner, G. W., Rein, M., & Miller, L. (2009, April). Correlates of success among clients in the Back on TRAC Alcohol Treatment Program: A Model of Student Drug Court. American Educational Research Association, Education, Health, and Human Services SIG, San Diego, CA.

11. TIME-LIMIT

The dissertation should be submitted to the university / institution within a period of six months from the date obtaining final examination and can be extendable to one year from the date of obtaining final pass in the subjects under study.

12. FEES

The stipulated fee as decided by the university / Institution should be remitted in the same manner as examination fee along with the dissertation, if any.

13. COPIES OF THE DISSERTATION

i. Six typed copies of the dissertation as well as of the synopsis are to be prepared and four copies of each are to be submitted to the University / Institution.
ii. Students will hand over one copy of each to the Guide and retain one of each for him. Therefore, altogether a Student has to prepare 6 copies of the dissertation
iii. None of the copies submitted will be returned to Students.

14. EVALUATION

i. There shall be an examination at the end of the each semester.
ii. Four typed copies of the dissertation shall be submitted by the Student within a period already specified under Ordinance 15.4 of the HPU.
iii. The dissertation shall be evaluated by an external examiner to be appointed by the Principal / HOD of the department / authorized representative of the HP University out of a panel of three examiners submitted by the Principal / HOD of the Department concerned in consultation with the Supervisor.
iv. The external examiner will submit the report on the dissertation and shall either approve/disapprove or recommend revision in the light of Ordinance, 15.5 of the HPU.
v. In case the dissertation is approved, the external examiner, supervisor of the Student (Internal Examiner) and the Principal or his nominee (only in those cases where the Principal is Supervisor) shall conduct an open viva-voce test.
vi. In case the dissertation is to be revised, it will be examined by the same examiner. In case the dissertation is rejected, it shall be sent to another examiner. If it is rejected by the second examiner also, the Student shall have to rework on the dissertation or could be assigned another topic for dissertation work and upon satisfaction of the supervisor, the Student can resubmit his / her dissertation for reevaluation. In case a new topic is being given to the Student, a fresh evaluation process will be followed.
vii. If the Student qualifies in the viva-voce, the degree shall be awarded provided the Student has cleared all the theory papers and the seminars.
viii. In case the Student is unable to clear the viva-voce, he/she will be given one more chance to clear it and the viva-voce shall be conducted by the same external examiner. In case the dissertation is approved, marks shall be awarded for dissertation by the external examiner and

these awards along with the report and Internal assessment marks by the supervisor will be submitted directly to the Controller of Examinations.

ix. In order to expedite the viva-voce test of the Student, the Institute / University may take suitable action as may be necessary in consultation with the Principal / HOD of the Department concerned.

15. PUBLISHING RIGHTS

i. The dissertation in the form of research manuscript(s) / paper(s) may be submitted and published before the decision of the examination committee for its acceptance or otherwise.

ii. The University / Institution will have the right to use the dissertation in any manner that may be deemed as suitable.

iii. In case the author wishes to publish the full dissertation with due acknowledgement to the University / Institution that it was a dissertation prepared for the University's examination, a declaration has to be made by the Student in this effect prior permission for its publication must be obtained from the University / Institution.

16. FORMAT OF THE DISSERTATION

The format to be followed for submission of the dissertation is as follows.

i. **Paper:**
The Dissertation shall be typed double spaced on white paper, print size.80 gsm Bond of the original typescript and carbon copy.

ii. **Margin:** The typed sheet shall have the following margins.
Left 38mm, Top25mm, Right 25mm, Bottom 25mm.

iii. **Binding:** The dissertation shall be cloth / resin bound in black.

iv. **Lettering**
   a. The lettering shall be inscribed on the bound back and the front cover.
   b. The bound back shall contain the title and the last name of Student in **12 mm** size letters.

v. **Front Cover**
   a. A **1.25 inch X 1.25** inch size of the **Institute emblem** should be properly placed in the centre of the front page
   b. The front cover should be **Black colour** and contain the following details.
      ⇒ Top-the title in block capitals of **18mm size letters**, properly centered.
      ⇒ Center-Full name of Students and University Roll No. in block capitals of **12mm** size letters, properly centered.
      ⇒ Bottom- Name of institution (University) with address, year of submission-all in block capitals of **14 mm** size letters in separate lines with spacing and properly centered.

vi. **Blank Sheets:** At the beginning and at the end of the dissertation two white blank sheets of 80 gsm, bond paper shall be provided one for the purpose of binding and another to be left blank.

vii. **Title Sheet:** The Title sheet shall be the first typed sheet and shall follow immediately the blank sheet. This shall be the first printed page of the dissertation and shall contain the submission statement: the Dissertation submitted in partial fulfillment of the requirements of the Degree, M.Tech in Electronics & Communication Engineering , the name and Roll No. of the Student, name(s) of the Supervisor and Co supervisor (s) (if any), Department, Institute and year of submission. Sample copy of the 'Title Sheet' is appended (Specimen 'A')

viii. **Acknowledgements**
Acknowledgements shall be on a separate sheet and it shall indicate the extent to which assistance has been received by the Student in his work from various sources.It is used to thank those persons

who have been instrumental to the student in completing the degree requirements. Acknowledgement of grants and special funding received to support the research also may be made on this page.

ix. **Abstract:** Every dissertation shall have an abstract following the title sheet. The abstract shall be a concise summary of essential features of the material contained in the dissertation. The abstract shall not exceed 200 words. It should contain Purpose, Methods, Results and Conclusions of the Dissertation Work.

x. **Contents**

The contents shall follow the abstract indicating the title of Chapters, Section and Sub- section etc. using decimal notation and S.I System of units of scientific and laboratory data with corresponding page numbers.

xi. **Appendices**

Appendices shall follow references of the dissertation and will be numbered in small Roman. The appendices shall normally contain detailed or lengthy derivations, sample calculation, voluminous large figures and calculations.

17. FONT AND LANGUAGE

The dissertation must be in English language having times new roman font with suitable differentiation of heading subheading and running text with uniform approach. The heading may be in upper case subheading in title case and running text with in sentence case.

18. POWER TO MODIFY

Notwithstanding all that has been stated above the University / Institution has the right to modify any of the regulations from time to time.

ANNEXURE I

THE CONTROLLER OF EXAMINATION
HIMACHAL PRADESH UNIVERSITY, SHIMLA

Sir,

We are pleased to inform you that Mr._____
_____

a student of the (Name of the institution)_____ has sought our guidance for carrying out his / her dissertation work as part of the requirements for awarding **M.Tech in Electronics & Communication Engineering.**

We have studied the proposed dissertation work in detail and of the opinion that it will bring out the effective application of Electronics & Communication Engineering / related fields / technique and practices in the following area:

_____

_____

We are also of the opinion that the proposed dissertation work can enable the student to meet the dissertation requirements laid down by the examination committee.

We give our consent to guide him / her for the dissertation work.

Name of the Guide _____

Professional Qualification_____

Designation _____

Address (Office) _____

_____

Address (Permanent Residential) _____

_____

Signature of the Guide **Signature of the HOD** **Signature of the Principal**

Date: _____ _____ _____

Place: _____ _____ _____

ANNEXURE II

STUDENT'S DECLARATION

I hereby, certify that the work, which is being presented in the dissertation, entitled "------
---

----" in fulfillment of the requirement for the award of Degree of **M.Tech in Electronics & Communication Engineering,** submitted in the Department of Electronics & Communication Engineering of -----(Name of Institution and Place)----, Affiliated to Himachal Pradesh University, Shimla, India is an authentic record of my work under the supervision of ----------
-----(Name of Guide)----------.

The results embodied in this thesis have not been submitted by me or any body else to any other University or Institute for the award of any Degree or Diploma.

The dissertation contains my own work and it does not include any copyright material of any person or publication.

(NAME OF THE STUDENT)

CERTIFICATE

This is to certify that the above statement made by the Student is correct to the best of our knowledge.

(NAME OF THE GUIDE)
Institution

(HEAD OF THE DEPARTMENT)
Institution

PRINCIPAL
Institution

The Student has passed the viva-voce examination held on..... (Date)..... at ---- (Institute) -----
-------. -------- (Place) ---------.

The dissertation is recommended for the award of M.Tech in Electronics & Communication Engineering.

Internal Examiner

External Examiner

SPECIMEN 'A':

TITLE SHEET

SIZE
18 POINTS BOLD
CENTRE

(TITLE)

Submitted in partial fulfillment of the requirements
of the degree of
(Master of Technology in _____) of
_____University_____

by
(NAME OF THE STUDENT)
(ROLL NO._____)

SIZE
12 POINTS BOLD
CENTRE

Under the Supervision of

_____

_____

A 1.25 inch X 1.25 inch size of the Institute emblem

LOGO

NAME OF THE DEPARTMENT
INSTITUTION
UNIVERSITY
PLACE
(MONTH, YEAR)

SIZE
14 POINTS
BOLD CENTRE

DISSERTATION AT A GLANCE

The sequence in which the thesis material should be arranged and bound should be as follows:

1. Top cover page
2. Two blank pages
3. Inside cover page
4. Dedication page (Optional)
5. Student's declaration / Bonafide Certificate
6. Certificate from the Supervisor
7. Acknowledgements
8. Abstract
9. Table of Contents
10. List of Tables
11. List of Figures
12. List of Symbols, Abbreviations or Nomenclature (Optional)
13. Chapters
14. References
15. Appendices
16. List of papers published as a part of dissertation work.
17. Brief Curriculum Vitae
18. Two blank pages

QUICK REFERENCE

PAGE DIMENSIONS

Paper size: 80 gsm. Standard A4 size (210 mm X 297 mm)

MARGINS

Top edge: 1 inch (25 mm)

Left side: 1 ½ inch (38 mm)

Bottom edge: 1 inch (25 mm)

Right side: 1 inch (25 mm)

Print out: LaserJet or Inkjet printer, **printed on only one side**

Font size (regular Text): Times New Roman of 12 pts

Spacing: Single line, Normal

CHAPTERS: 14 PTS BOLD TOP CENTRE ALIGNED (CAPITAL LETTERS) (1, 2, 3…)

SECTIONS: 12 PTS BOLD LEFT ALIGNED (CAPITAL LETTERS) (1.1, 1.2…)

Subsections: 12 pts bold left aligned (Title case) (1.1.1, 1.1.2…)

Page numbers (Chapters): Bottom – centered – 12 pts (1, 2, 3…)

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