

Bundelkhand Institute of Engineering & Technology, Jhansi

Department of Electronics & Communication Engineering

M.Tech. Digital Communication

Year – 1

Semester – I

S. No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
						SESSIONAL EXAM.			Es E		
			L	T	P	CT	TA	Total1			
THEORY SUBJECTS											
1.	DC 11	Representation and Analysis of Random Signals	3	1	0	30	20	50	100	150	4
2.	DC 12	Digital Communication	3	1	0	30	20	50	100	150	4
3.	DC 13	Information Theory and Coding	3	1	0	30	20	50	100	150	4
4.	DC 14	Advanced Digital Signal Processing	3	1	0	30	20	50	100	150	4
		Total	12	4	0	120	80	200	400	600	16

Bundelkhand Institute of Engineering & Technology, Jhansi

Department of Electronics & Communication Engineering

M.Tech. Digital Communication

Year – 1

Semester - II

S. No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
						SESSIONAL EXAM.			Es E		
			L	T	P	CT	TA	Total1			
THEORY SUBJECTS											
1.	DC 21	Detection and Estimation Theory	3	1	0	30	20	50	100	150	4
2.	DC 22	Optical Communication	3	1	0	30	20	50	100	150	4
3.	DC???	Elective I	3	1	0	30	20	50	100	150	4
4.	DC???	Elective II	3	1	0	30	20	50	100	150	4
		Total	12	4		120	80	200	400	600	16

Bundelkhand Institute of Engineering & Technology, Jhansi

Department of Electronics & Communication Engineering

M.Tech. Digital Communication

Year – 2

Semester – III

S. No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit	
						SESSIONAL EXAM.			Es E			
			L	T	P	CT	TA	Total1				
THEORY SUBJECTS												
1.	DC???	Elective I	3	1	0	30	20	50	100	150	4	
2.	DC???	Elective II	3	1	0	30	20	50	100	150	4	
3.		Seminar	-	-	8	-	-	50	-	50	3	
4.	DR 1	Dissertation	-	-	8	-	-	-	50	50	3	
		Total	6	2	16	60	40	150	250	400	14	

Bundelkhand Institute of Engineering & Technology, Jhansi

Department of Electronics & Communication Engineering

M.Tech. Digital Communication

Year – 2

Semester – IV

S. No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
						SESSIONAL EXAM.			Es E		
			L	T	P	CT	TA	Total1			
THEORY SUBJECTS											
1.	DR 2	Dissertation	-	-	32	-	-	200	200	200	18
		Total	-	-	32	-	-	200	200	200	18

ELECTIVES (I & II) LIST

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	DCE-23	Spread Spectrum Communication	3	1	0	4
2	DCE-24	Computational Methods for Communication	3	1	0	4
3	DCE-25	Telecommunication System Engineering	3	1	0	4
4	DCE-26	Advanced Antenna and Propagation	3	1	0	4
5	DCE-27	Digital Image Processing	3	1	0	4
6	DCE-28	Microwave Communication	3	1	0	4
7	DCE-29	Computer Communication	3	1	0	4
8	DCE-30	Neural Network	3	1	0	4

ELECTIVES (III & IV) LIST

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	DCE-31	Array Processing	3	1	0	4
2	DCE-32	Internet and Intranet	3	1	0	4
3	DCE-33	Radar Engineering	3	1	0	4
4	DCE-34	Quencing Systems	3	1	0	4
5	DCE-35	Cryptography and Data Security	3	1	0	4
6	DCE-36	Opto Electronic Devices	3	1	0	4
7	DCE-37	VLSI Design	3	1	0	4
8	DCE-38	Optical Computer	3	1	0	4
9	DCE-39	Architecture and Applications of Digital Signal Processors	3	1	0	4
10	DCE-40	Speech Signal Processing	3	1	0	4
11	DCE-41	Photonic Networks and Switching	3	1	0	4
12	DCE-42	Satellite Communication	3	1	0	4
13	DCE-43	Mobile Communication	3	1	0	4

Details of Course Contents For Each Subjects

DC– 11 REPRESENTATION AND ANALYSIS OF RANDOM SIGNALS

Random variable, distribution functions and probability densities - Expected value and moments of random variables - coefficient of variation, skewness and kurtosis - of random variables conditional mean and variance - moment generating function - Characteristics function – Cumulants – probability generating function.

Discrete random variables and their distributions- Binomial, Negative Binomial, Hyper geometric and multinomial distributions- Poisson distribution- Relationship between distributions of various Discrete type random variables.

Continuous random variables and their distributions- Normal, Log-normal, multivariate normal distribution- Gamma, Exponential, Chi-square, Weibull, and Rayleigh distributions- Relationship between distributions of various continuous type random variables.

Transformation of single random variable- Transformation of several random variables- function of random variables- Sum, difference, product and ratio of random variables- Transformation through characteristic functions.

Stochastic processes- classification- Stationary processes- Ergodic processes-Independent increment processes- Markov processes- counting processes- Narrow-band process- Stochastic processes for analysis of physical phenomena Normal(Gaussian), Weiner- Levy, Poisson Bernoulli and shot noise processes- Auto correlation function.

TEXT BOOKS:

Michel K. Ochi, Applied Probability and Stochastic Processes in Engineering and Physical Sciences, Wiley,1992.

REFERENCE BOOKS:

A. Papoulis, Probability, Random variables and Stochastic Processes, McGraw Hill, 1985.
Kishore.S.Trivedi,

DC-12 DIGITAL COMMUNICATION

1. Base Band and Band pass transmission- Base Band transmission- wave form representation of Binary digits - PCM, DM, ADM system. Detection of binary signals in Gaussian noise - Matched filter - Application of matched filter – Error probability performance of binary signaling - Multilevel base band transmission - Intersymbol interference - compandor- A law and law detectors.

2. Digital modulation techniques- PSK, APSK, FSK, & ASK, Detection of signals in noise- correlation receiver - Coherent and non coherent detection PSK & FSK - Errorperformance of binary system - comparison of bit error performance of binary system - M-ary signaling - Vectorial view of MPSK and MFSK- error performance.

3. Channel Coding- Waveform coding- types of coding- Convolutional Coding, Interleaving and commercial telephone modem, Trellis Coded modulation.

4. Synchronization- Receiver Synchronization, coherent systems- symbol and frame, Synchronization network, Synchronization- Open and closed loop systems.

5. Spread spectrum- Spread spectrum techniques- Spreading techniques- PN sequences- Direct Sequence Spread spectrum system- Frequency hopping system- Examples- Fast and slow hopping- Demodulation schemesSynchronization- Tracking and Acquisitions.

6. Encryption and Decryption- Model Encrypter- Decrypter, Cipher system Stream data encryption, standard stream encryption, Public key encryption system.

TEXT BOOKS:

Simon Haykin, Digital communication, John Wiley, 1988.

REFERENCE BOOKS:

Taub and Schilling, Principles of Digital Communication System, Mc Graw Hill 1986. Bruce Carlson, Principles of Digital Communication, McGraw Hill, 1988.

R.F.Ziener and W.H.Tramter, Principles of Digital Communication, Jaico publishing

DC-13 INFORMATION THEORY AND CODING

1. Information and Channel Capacity

Measure of Information- Information content of message - Average Information Content(Entropy) of Symbols in long independent sequences - Markow statistical model for information sources – Entropy and information rate of Markow sources - Channel capacity theorem- Some properties.

2. Source encoding

Shannon's first fundamental theorem - Noiseless coding - Source with finite memory -Shannon's second fundamental theorem on coding for memory less noise channels-Shannon's encoding algorithm.

3. Discrete communication Channels

Discrete communication channels- Rate of information transmission over a discrete channel- Capacity of discrete memoryless channels- Discrete Channels with memory-Discrete channels with continuous noise- Discrete channel with discrete noise.

4. Continuous communication channels

Continuous channels- Shannon- Hartley Theorem implication- Continuous channel with Continuous noise- Efficiencies of different communication system.

5. Error correcting codes

Galois fields, Vector spaces and Matrices- Block codes, Binary cyclic codes- Multiple Error correcting codes- Majority logic decoding- Convolution codes- Burst error correcting codes- Two Dimensional codes- ARQ-performance of Codes.

TEXT BOOK:

J.Das, S.K.Mullick, P.K.Chatterjee, Principles of Digital Communication, Wiley Eastern Limited,1986.

REFERENCE BOOKS:

K.Sam Shanmugam, Digital and Analog Communication System, John Wiley & Sons, 1985.

A.J.Viterbi and J.K.Omura, Principles of Digital Communication and Coding,

DC-14 ADVANCED DIGITAL SIGNALS PROCESSING

1. Modelling of filters

Power spectrum sample random filter, model of first order Markov process-parameter Identification
Linear prediction and signal modeling, minimal phase signals and filters, minimum delay property, spectral factorization theorem.

2. Linear estimation

Linear estimation of signals stationary, Wiener filter as Kalman filter, Construction of Wiener filter least as Kalman filter, Construction of wiener filter as Kalman filter.

3. Linear prediction

Auto representative model levenson recursion – Analysis and synthesis of lattice filters, Schur algorithm –FIR wiener filter, Least square wave shaping and spiking filters.

4. Spectrum estimation

Spectrum estimation by auto regressive modeling, spectral analysis of sinusoids in noise, Maximum likelihood method, Spatial smoothing.

5. Adaptive filters

Adaptive implementation of Wiener filter – Adaptive linear combiner – Adaptive FIR Wiener filter- Adaptive Channel equalizer- Adaptive echo cancellers- Adaptive noise canceling- Adaptive linear prediction.

TEXT BOOKS:

Sophoclas J Orfanidis, Optimum Signal Processing, McGraw Hill, 1990.

J. G. Proakis, C. M. Rader, F. Ling and C. L. Nikis, Advanced Digital Signal Processing Maxwell Macmillan International Edition, 1992.

J. V. Candy, Signal Processing, McGraw Hill, New York, 1986.

REFERENCE BOOKS

B. Mulgrew and Colin F. N. Cowan, Adaptive Filters & Equalisers, Kluwer Academic Publishers, Boston, 1998.

J. V. Candy, Signal Processing, McGraw Hill, New York, 1986.

DC– 21 DETECTION AND ESTIMATION THEORY

1. Stochastic signal, orthogonal representation of signals, random process, Markov process, correlation function, power spectral density. Tehebycheffi inequality.
2. Detection in presences of noise, correlator, optimum filter, matched filter.
3. Weighted probabilities and hypothesis testing, composite hypothesis, likelihood ratio detection, sequential detection.
4. Principles of estimation, properties of estimator, Cramer- Rao Bound, Baye's maximum likelihood and least square estimation, parameter estimation, estimation of continuous waveforms, time invariant linear estimation.
5. Current Trends Compensation of Adaptive arrays current trends in adaptive array

SUGGESTED TEXT BOOKS AND REFERENCES:

1. Principles of digital Communication: J.Das, S.K. Mullick, P.K. Chatterjee, New age International (P) Ltd publisher, New Delhi
2. Modern digital and Analog communication Systems, B.P. Lathi, Oxford publishers.

DC-22 OPTICAL COMMUNICATION

1. Introduction to optical communication, Principles of transmission Optical Fiber modes and Configuration Mode, Theory for Circular Waveguides, Single Mode Fiber, Multi Mode Fiber, Numerical Aperture, Mode Field Diameter, V number Fiber Fabrication technique.
2. Optical sensors, LED's, Laser. Diodes, Modal reflection noise, Power launching & Coupling, Population Inversion, Fiber splicing, Optical connector, photo detector, PIN, avalanche detector response time, Avalanche Multiplication noise.
3. Signal degradation in optical fibers, Attenuation losses, signal distortion in optical waveguide dispersion, chromatic dispersion, Intermodal distortion, pulse broadening in Graded index fibers, Mode Coupling, Advanced Fiber Design, Dispersion shifted , Dispersion Compensating Fiber, Design Optimization of single mode Fibers.
4. Coherent Optical fiber communication, Modulation Techniques, Misalignment, Fiber to fiber joints optical fiber link design, Rise time budget and link power budget , long-Haul systems, Bit error rate, Line coding, NRZ, RZ, Block codes, Error correction
5. WDM concepts and components operation, Fiber granting, hologram, Tunable Filters, Directional coupler, Dispersion management, Optical amplifiers: EDFA, Photonic switching , Optical Networks: SONET/SDH, optical interference, ring topology, star topology.

Suggested Text books and References:

1. G.Keiser, "Optical Fiber Communication(3rd edition) "Mc graw hill,2000
2. D.F. Mynbacy and L. Scheiner,"Fiber optic communication technology"
3. Ghatak and K. Thyangrajan,"Introduction to fiber optic", Cambridge University press,1988

DCE-23 SPREAD SPECTRUM COMMUNICATION

1. Pseudo-noise generator

Origins of spread spectrum (SS) communication – advantages of spectrum spreading example of early. Models- processing gains and other fundamental parameters jamming method-Linear feedback shift register sequence generation- M sequences and then statistical properties- correlation properties-nonlinear sequences – gold sequences.

2. Spread spectrum techniques

Coherent direct sequences system- Model of a DS/BPSK system- uncoded bit error probability for arbitrary. Jammer waveforms- Chernoff bound – performance under constant power broad band noise jammer- pulse jammer – partial jammer – Multitone jammer- coded DS/BPSK systems.

3. Frequency hopping SS System

Non-coherent FH system model- Coherent FH system- Frequency synthesis- Performance of FH QPSK and FH DPSK systems in presence of partial band jamming- Time hopping SS technique.

4. Synchronization of SS receivers

Acquisition and tracking in DS and receivers sequential estimation Matches filter Techniques of acquisition and tracking Delay Locked loop Tau-Dither loop.

5. Applications

Code division multiple access in Satellite Communication antijam military communication low. Probability of intercept communication-Mobile communication.

TEXT BOOK:

R. C. Dixon, Spread Spectrum Systems, John Wiley, 1984

REFERENCE BOOKS:

M. K. Simon, J. K. Omura, R. A. Scholtz and B. K. Levitt, Spread Spectrum Communication, Vol-I VOL-II Computer Science Press USA 1985.

G. R. Cooper and Mc Gillem, Modern Communication and spread spectrum

DCE-24 COMPUTATIONAL METHODS FOR COMMUNICATION

1. Solution linear simultaneous and transcendental equations, Eigen values problems method. Jacobi's method and solution of communication problem.
2. Analytical method Separation of variables orthogonal functions, series expansion, some practical. Application of communication.
3. Numerical integration, fuler's rule, Trapezoidal rule. Simpson rule. Newton cote's method Newton-Raphson method and Gussian quadrature method. Finite Element method. Solution of poission and wave equations and other communication problems.
4. Basic MATLAB function and applications, Fuzzy set theory and application to communication problems. Fuzzy MATLAB tools.
5. DFT, FET and MATLAB tools for wavelet transform.

TEXT BOOKS AND REFERENCE:

1. Numerical hods in science & engineering, Dr. M. K. Venkataraman, Nationbal Pub. Co. 1991
2. Computer Oriented Statistical and numerical methods. B. Balaguru Swamy. Macmillan India Ltd. 1998
3. Numerical methods for scientific and engineering computation, M. K. Jain, S.R.K. Lyengar and R. K. Jain. Willey Eastern Ltd. 1987
4. Cmmunication Systems, S. Haykins. John Wiley and Sons.

DCE-25 TELECOMMUNICATION SYSTEM ENGINEERING

Recursive construction of switches, strictly Non-blocking, rearrange Non plucking close theorem. Slepian Duguid theorem. Pauli's matrix. Cantor network. Traffic Engineering Network traffic arrival and service characterization. Erlang formulac, mathematical modeling Blocking models (Lee's approximations) Karnaugh's method for blocking probability estimate. Switching systems Stored program control (SPC) exchange. Space, time switch implementation. Super multiplexing. Operating system architecture for switching system. Overload control mechanisms. User to network signaling. Pulse, tone signaling, common channel signaling. SS7 architecture and protocol stack. IP telephony. In network architecture packet switching General architecture. Banyan networks, Delta networks, Shuffle net as data network, buffered Banyan network, Input vs. output queuing, Discussion of various packet switching architecture.

TEXT BOOK:

1. Joseph Y. Hui, Switching and Traffic Theory for integrated broadband networks, Kluwer Academic Press.
2. M. Schwartz, Telecommunication Networks: protocols, modeling and analysis, Addison-Wesleylongman publishing company, Boston, 1986.

REFERENCE BOOKS:

1. H. Jonathan Chao, Broadband Packet Switching Technology – a practical guide to ATM switchesand IP routers, John-wiley and sons, Inc.
2. T. Viswanathan, cm Telecommunication Switching Systems and networks Prentice Hall of India 1992.
3. R. L. Freeman, Telecommunication System Engineering, John wiley and sons.

DCE-26 ADVANCED ANTENNAS AND PROPAGATION

Radiation from cylindrical antennas

Electromagnetic fields and theory of radiation- Geometrical optics- GTD and its application- Thin linear antennas- patterns of cylindrical antennas Integral Equation and moment method and their application to wire antenna.

Aperture antennas

Slot antennas- Babinet's principles- Rectangular horn- conical horn- ridge horn-spectrum horn corrugated horn- micro strip patch antenna- Feed methods of microstrip antenna- parabolic reflector antenna- cassegrain feed- lens antenna- fermat's principle-metal plate lens- artificial dielectric lens antenna.

Antenna Arrays

Pattern multiplication- Linear arrays with optimum dolph- Tchebyscheff distribution-Phased array antenna application- yagi-uda array- Microstrip arrays- log periodic dipole array.

Antenna Synthesis and Measurements

Continuous sources- Schelkunoff polynomial method- Fourier transforms method- Wood ward method pattern- phase- directivity- gain polarization- impedance measurements.

Propagation

Radio wave propagation- ground wave- surface wave- Ionospheric propagation-Faraday rotation microwave and millimeter wave propagation- Attenuation due to rain, fog and atmospheric gases- Troposcatter propagation- duct propagation- Rain effects on antenna noise temperature.

TEXT BOOKS:

J.D.Kraus, Antennas, McGraw Hill, 1989.
Edward A.Wolff, Antenna Analysis, Arctect House, 1988.

REFERENCE BOOKS:

Johnson and Jasik, Antenna Engineering Handbook, McGraw Hill, 1984.
Balanis, Antenna Theory and Design, John Wiley, 1982.
Lucien Boithias, Radio Wave Propagation, North Oxford, 1987.

DCE-27 DIGITAL IMAGE PROCESSING

1. Introduction to Image Model and Transforms

Digital image representation- Image processing system- Digital Image fundamentals Image Model – sampling and Quantization – Introduction to Fourier transform- properties – Discrete fourier transform – Fast fourier transform – separable image Transform – Hough Transform.

2. Image Enhancement

Spatial Frequency – Domain methods – histogram Modification techniques – Direct modification techniques – Direct histogram Specification – image smoothing – Image Sharpening.

3. Image Restoration

Degradation model – Diagonalization of circulant and Block circulant matrices Algebraic approach Inverse filtering Wiener filtering.

4. Image Encoding

Fidelity criteria – the encoding process – error free encoding relative to a Fidelity criteria.

5. Image Segmantation

Detection or Discontinuities – Edge linking and Boundary linking – Threholding region Oriented segmentation.

TEXT BOOK:

Refacl C. Gonzalez, Paul Wintz. Digital Image Processing, Prentice Hall, 1987.

REFERENCE BOOKS:

Anil K. Jain, Fundamental of Digital Image Processing, Prentice Hall, 1987

A. Resenfeld. A. C. Kak, Digital Image Processing, Academic press, 1979

DCE-28 MICROWAVE COMMUNICATION

1. Introduction to line of sight radio link Engineering

Simplified microwave system-Microwave repeater- Diversity. Protection switching microwave radio Station – system gain Fade Margin. Basic transmission loss- Total path loss- Types of calculations- Interference path performance and availability calculation – path profiles- parameters used in path Calculations-effective earth radius and Fresnel zone clearance.

2. Interference

Sources and effects of RF interference – Attenuation limiting Interference performance of digital radio Link systems- The choice of intermediate frequencies for high equality digital radio link systems – Interference calculation – Method of preventing interference using special screens, interference Cancellars and by a method of frequency separation.

3. Frequency Planning

Emission spectra and design of FCC emission spectrum mask – spurious emission and EIRP limits – choice of RF frequency and spectrum utilization – frequency separation.

4. Digital Microwave Radio Equipments

Transmitter circuits –Transmitter base band circuits-16QAM modulators-receiver circuits – receiver RF circuits – Receiver base band circuits – base band bit combiner.

5. System Tests

The testing of digital radio relay links Introduction methods of making C/N measurements – In station tests-End-to-End tests.

TEXT BOOKS

1. A.A.R. Townsend, The Design of LOS radio Links Prentice Hall, 1989.
2. Kamilo Feher, Digital Communications: Microwave Application, Prentice Hall, 1981.

REFERENCE BOOKS:

1. WAYNE Temast: Advanced Electronics Communication Systems, Prentice Hall, 1987, R. E. Collin.
2. Antennas and Radio Wave Propagation, McGraw Hill Edition, 1987.
3. Lucien Boithias, Radio wave propagation, North Oxford Academy, 19

DCE-29 COMPUTER COMMUNICATION

1. Introduction

The uses of computer networks-Network architecture – OSI reference model-services example Networks-Physical Layer – transmission media- transmission and switching – ISDN- terminal handling.

2. Medium access and data link layers

LAN-Aleha protocols- LAN protocols-IEEE standard 802 for Lan-Ethernet CSMA CD LAN, Token Passing ring- Data link layer design – protocols-simplex stop and wait, sliding window- protocol performance-high level data link control.

3. Networking and transport layers

Network layer design issues – routing algorithm- congestion control algorithms internetworking transport layer design issues- connection management- simple transport protocol on top of X25.

4. Presentation Layer

Design issues- abstract syntax rotation- data compression techniques- cryptographyremote procedure call.

5. Application Layer

Design issues- file transfer access and management- electronic mail- virtual terminals other applications.

TEXT BOOKS:

Andrew S. Tanenbaum. Computer Network Prentice Hall of India, New Delhi, 1990.

REFERENCE BOOKS:

Misha Schwartz, Telecommunication Network-Protocols, Modeling and Analysis, Addison Wesley, 1989.

W.Stalling, Data and Computer Communication, 2nd Edition, New York, Macmillan, 1988.

DCE-30 NEURAL NETWORK

1. Introduction

Introduction and history, human brain, biological neuron, models of neuron, signal flow graph of neuron, feedback, network architecture, knowledge representation, Artificial intelligence and neural networks. Learning Process : Supervised learning, Unsupervised Learning, Reinforcement Learning, Competitive Learning.

2. Artificial Neurons, Neural networks and architectures

Introduction, neuron signal function, mathematical preliminaries, Feed forward & feedback architecture.

Geometry of Binary threshold neurons and their networks, Complex Neuron Model

Learning Rules : Hebbian Learning rule, Perceptron Learning rule, Winner Take all Algorithm, Delta Learning rule

Stochastic Machines

Statistical mechanics, simulated annealing, Boltzmann Machine.

3. Perceptrons and LMS

Learning objective of TLN, pattern space & weight space, TDNN, Multilayered architecture, back propagation learning algorithm, applications of feed forward neural networks, RBF Networks

Regularization networks, generalized RBF networks, RBF network for solving XOR problem, comparison of RBF networks, RBF network for solving XOR problem, comparison of RBF networks & multilayer perceptrons.

4. Adaptive Resonance Theory

Building blocks of adaptive resonance, Adaptive Resonance Theory 1. Self Organization Feature MAP, K means Algorithm

Introduction, Maximal eigenvector filtering, principal component analysis.

5. Fuzzy Logic

Introduction, Membership Functions, Fuzzy Rules, Fuzzy System, Hybrid Neuro Fuzzy System, Applications.

Text Book:

1. Kumar Satish, "Neural Networks", TMH
2. Simon Haykin, "Neural Networks", PHI
3. J. M. Zurada, "Introduction to Artificial Neural Systems", Jaico Publishers, 3rd Ed

DCE-31 ARRAY PROCESSING

1. Principal

Motivation for using adaptive arrays- Historical perspective- principles system elements- Adaptive array problem statement- Existing technology.

2. Signal and Element Considerations

Signal environment – Array element spacing consideration – Array performance- Nulling limitation Narrowband and broadband and signal processing considerations.

3. Optional Intimation of Array Performance

Optimum array processing- Steady- State performance limits and wiener solution.

4. Algorithms

Gradient based algorithms- Howels – Apple Baum Adaptive processor – Direct inversion of The sample Covariance Matrix- Recursive methods for adaptive array processing- Cascade Processors- Random Search Algorithms.

TEXT BOOKS:

Array processors by John William Brate, Willy Publication 1972.

DCE-32 INTERNET AND INTRANET

Development of Internet, designing principles of Internet working architecture Internet work issues.

Network layer structure Internet protocol standards Internet IP Ipv6 The ISO Internet protocol ISO

Routing Protocols

The word wide web: Web fundamentals. URL, Web protocols—HTTP, SSI, Services HTTP other web Tools FTP, HTML, Java, VRML, Jargon IRC, WAIS.

Net components: Internet terminology, Provider, client & browser, services, viewers, Gateway and Routers, Internet & Extranet

Suggested Text Books and references:

1. Data Communication, Computer Networking and Open system F Halshal Addison Wesley
2. Internetworking with TCP/IP Volume I : Comer .PHI
3. Launching Business on the Web David Cook PHI

DCE-33 RADAR ENGINEERING

1. Prediction of range performance, Minimum Detectable signal, Receiver Noise, probability. Density function, signal to noise ratio, section of target, cross section fluctuation, pulse repetition freq. and range ambiguities.
2. CW and freq. Modulated radar, MTI, pulses Doppler radar, Tracking radar phased array radar Transmitter power, Various transmitter tubes and their characteristics, modulators, line type modulator, hard tube modulator solid state transmitter.
3. Radar Antenna: Antenna parameters, Antenna radiations patterns Aperture distribution pattern synthesis, effects of errors on radiation patterns stabilization of antenna parabolic reflected antenna, scanning feed reflector antenna, lense antenna, electronically steered phased array antenna.
4. Detection of Radar signal in Noise, Detection Criteria, matched filter receiver correlation detection.
5. **Echo cancellation:** Synthetic and coded speech quality assessment ; Selection of recognition unit ; Model- based recognition ; Language modeling; Speaker Identification; Text analysis and text -to- speech Synthesis

SUGGESTED TEXT BOOKS AND REFERENCES:

1. E.L. Giunzton, "Microwave Measurements", McGraw Hill Book Co. Inc. 1957.
2. SR Adams, "Microwave theory and applications", Prentice Hall Inc. 1969.

DCE-34 Queueing Systems

Review of probability and stochastic processes. Markov chains, Little's theorem modeling and analysis of M/M – queues, Murke's Theorem, Reversibility, Method of stages, Analysis of M/G/I queues. Queues with vacations. Work conservation principle, Priority queues served in cyclic order, Fluid – flow and diffusion approximations.

DCE–35 Cryptography and Data Security

1. Internet and communication protocol, A brief history of Internet OSI TCP/IP, the need for tunneling and encryption keys, tunneling, Internet protocol security.
2. Deterring Needs – The evaluation of security assessments, assessing needs in house, the management role, web access questions. Containers network vulnerability detection, penetration testing internet security needs structured query language security and other specialties.
3. Trends in Internet crime. Demol of service attach, tools, that works for the against the network IP Spooling attade the Telnet hole, languages vulnerabilities. Other – java and active X. unix root control Trojan Hares.
4. Virtual private network. Fire walls and disaster recovery planning security tools. Different encryption and decryption algorithm concept of private and public keys.

Suggested Text Books and References

1. Introduction to cryptography – H Delfs H. Knebi-2002 Springer
2. Introduction to cryptography – J. A. Buchamann – 2001 Springer
3. Information Security and Cryptography – ICISC 2001, K Kim Ed 2002 vo 2288 Springer
4. Understanding data comm.. and network – Shay Vikas Thomas Pub.
5. Information security and cryptography – ISISC 2000 byD. Won Vol 2015 etc 2001 Springer.

DCE–36 Opto Electronics devices

1. Introduction to optical wave guides

Integrated optic – Substrate material for optical integrated circuits- Optical wave guide modes – Theory of planer wave guides – Symmetric and asymmetric slab wave guides – Channel waveguide – Strip loaded waveguide – Losses in optical waveguides Transversc couplers- Prism couplers- Grating couplers- Tapered couplers- Fiber to waveguides couplers.

2. Electro optic Modulators

Characteristics of switchesand Modulators- Electro optic effect – Single and dual channel waveguide- Electro-optic modulators – Mach Zehnder type electro-optic modulator- Comparison of waveguides modulators.

3. Acousto – optic Modulators

Principle of acousto-optic effect- Raman- Nath type modulator- Bragg type deflectors and swiches acousto- optic frequency shifters.

4. Magneto Optic Devices

Characteristics of magneto optic effect- Non reciprocal waveguides – Interaction between magnetic spin waves and optic wave- Optical isolator- optical alternator- Optical filter.

5. Non linear Fiber Optics and Applications

Fiber non lineartics- Optical solutions- Non linear birefringence effects- Optical pulse compression – RF spectrum analyzer- Analog to digital converter- Integrated optic Doppler velcimeter opto electronic integrated circuits- Opto microwave applications.

TEXT BOOKS:

R.G. Hullsberger, Integrated Optics: Theory and Technology Springer, Verlag Series, 1991.

G.P. Agarwal, Non Linear Optics, Academic Press, 1989.

REFERENCE BOOKS:

J. Wilson & J.F.B. Hawkes, Optoelectronics: An introduction Prentice Hall International series, 1983

L.J. Pinsion, Electro Optics. John Willey & Sons, 1085

L. Sharupich. N. Tugliv, Opto electronics. MIR Publishers, 1987.

DCE-37 VLSI Design

1. **Review of logic design fundamentals-** Combinational logic, K-maps designing with NAND and NOR gates. Hazards in combinational networks, mealy sequential n/w design Moore sequential n/w Synchronous design m/c design.
2. **Introduction to VHDL-** VHDL description & combinational N/W, modeling flip flops multiplexes using VHDL Processes. Compilation & simulation of VHDL Code. Modeling a sequential m/c variables, signals & constants, arrays VHDL operators, functions & procedures packages and libraries.
3. **Attributes-** Multivalued logic and signal resolution, IEEE 1164 standard logics, Generics, Generates Statement, synthesis of VHDL code, synthesis examples, files & TEXTIO.
4. **Designing with programmable logic devices-** ROM, PLA'S, PLD'S. designing with programmable logic arrays. CPLD's (Complex Programmable Logic Devices). Floating point arithmetic-Combinational logic testing, sequential logic testing, scan testing Boundary scan, built in self test.
5. **Design Examples & Case studies-** USART design, micro controller design, design of micro controller CPU, filter design etc.

Suggested Text Books and References:

1. VHDL, Primer-Bhaskar, m PHL 3rd Edition 1999.
2. Digital System Design using VHDL-Charles Roth- Thomson, 2nd Edition 2001.
3. Modern, VLSI design (System on Silicon)- Wayne walf, Pearson education Asia.

DCE-38 Optical Computer

1. Introduction

Basic elements of optical systems-Mirrors-gratings-lenses- Transducers-Spatial light modulators- Holographic elements- Fundamental Limitations on dynamic range-Hybrid optical electronics Systems – Dependence between optics and electronics.

2. Optical Image and Signal Processing

Spectral analysis and filtering- Pattern recognition – Picture deblurring Synthesis aperture radar imaging – radio signal analysis- simple arithmetic – matrix operations- Differentiations and integration Analog solution of practice differential equations.

3. Non- Linear Optics

Non Linear effects Optical bistability – Hybrid polarization devices- Optical phase conjugation uses of optical phase conjugation.

4. Digital Optical Computers

Internal representation – Implementations of binary logic elements – Implementation of arithmetic units- Memory- Inter connection and Communication – Architectures.

5. Feasibility and Technology

Thin film waveguides- Passive integrated optic devices- Active integrated optic devices- Analog Integrated optic devices- Properties and limitations.

Text Book

Dror G. Peitelsor Optical Computing, MIT Press, 1987

Reference Books:

A. Yariv, Optical Electronics, Holt- Saunders International Edition, 1985.

Digital Optical computing Proc. IEEE. Vol. 72, 1984.

DCE–39 Architecture And Application of Digital Signal Processors

Review of DSP fundamentals. Issues involved in DSP processor design – Speed, cost, accuracy. Pipelining, parallelism, quantization error, etc, Key DSP hardware elements- Multiplier, ALU, Shifter, Address Generator, etc. ADSP 2100 and 21000 family architecture and instruction set software.

Development tools- assembler – Linker and simulator. Applications using DSP processor – spectral analysis. FIR/IIR filter, linear – predictive coding etc.

Detector characteristics, ECM (Electro Magnetic Compatibility), ECCM receiver, radar signal design and corresponding receiver design, millimeter wave radar.

Suggested Text Books and References:

1. E. L. Giunzion, “Microwave Measurements”, McGraw Hill Book Co. Inc 957. Publications Prentice Hall Inc. 1969.

DCE–40 Speech Signal Processing

Spectral and non – spectral analysis techniques: Model – basel coding techniques: Noise reduction and Least square estimation, parameter estimation of continuous waveforms, time invariant Linear estimation.

Suggested Text Books And References:

1. Principles of Digital Communication: J.Das, S. K. Mullick, P. K. chatterjee, New Age International (P) Ltd publishers, New Delhi
2. Modern Digital and Analog Communication System, B. P. Lathi, Oxford Publishers.

DCE-41 Photonic Networks and Switching

Optical Communication : Introduction to basic optical communications and devices optical multiplexing techniques – wavelength division multiplexing. Optical frequency division multiplexing time division multiplexing, code division multiplexing.

Optical Networks : Why optical networks ? Conventional optical networks, SONET/SDH, DDI, IEEE 802.3 DQDB, FCS, HIPPI etc. Multiple access optical networks, Topologies signal channel Networks, multichannel networks, FTFR, FTTR, TTFR and TTTR. Single hop networks multihop.

Networks, multi-access protocols for WDM networks – issues and some designs, switched optical Networks. Optical amplification in all-optical networks. All-optical subscriber access networks Design issues.

Optical switching : Motivation Example of an optical switch using 2x2 coupler. Spatial light Modulator. Relational and non-relational switching devices. Fundamental limits on optical switching elements. Switching Architectures. Free space optical switching. Wavelength routed networks and Other special topics. Soliton based networks, Optical networks management issues.

DCE– 42 SATELLITE COMMUNICATION

1. Orbital Aspects of Satellite Communications

Orbital mechanics- Equations of the orbit- Satellite orbit location- Orbital elements- Look Angle determination- Sub-satellite point- Elevation, azimuth, calculations, Earth space Geometrical consideration- Satellite antenna coverage calculation- Effects of sun and moon- Eclipse duration- Sun transit outage- Launches and launch vehicles- Mechanics of launching a satellite- ELV and STS vehicle- Selection consideration for a launch vehicle.

2. Space Craft

Space craft sub systems- AOCS, TT& C, power systems, communications subsystems-Space craft antennas- Thermal control- Propulsion subsystem- Generation storage and conditioning of power systems.

3. Satellite Link Design

Basic transmission theory- system noise temperature, noise figure and G/T ratio-Design of down links- up link design- Link budget analysis- Design of satellite links for specified performance.

4. Multiple Station Technology

Frequency division multiple access- preassigned FDM/FM/FDMS- SPADE operation-Time division multiple access- High rate TDMA frame Operation- INTEL SAT TDMA operation- Code division multiple access- Direct sequence and FH systems-Comparison of the various accessing techniques.

5. Earth Station Technology

Factors influencing the choice and location of an Earth station- Equipment for earth stations- Antenna systems- overall block Diagram. Satellite communication application-FSS, MSS, BSS, RDSS and RNS.

TEXT BOOK:

T.Pratt and C.Bostain, Satellite Communications, New York, Wiley 1986.
G.Maral, M.Bousquet, Communications Satellite Systems, Wiley, 1985.

REFERENCE BOOKS:

K.Miya, Satellite Communications Technology RDD Engineering, Tokyo, Japan, 1982.
W.Morgan and G.D.Gordon, Communication satellite Hand book New York, Wiley, 1989.
D.C.Agarwal, Satellite Communications, Khanna Publishers, 1992.
K.Feher, Digital Communications: Satellite/Earth Station Engg. Prentice hall, Englewood Cliffs, NJ, 1983.

DCE– 43 MOBILE COMMUNICATION

1. Introduction

Basic Cellular System-Performance criteria – Uniqueness of mobile radio environment-
Operation of Cellular System

2. Moments of Cellular. Mobile Radio System Design

General Description – Cell splitting – Specification – Cell coverage and signals and traffic
Cell site antennas and mobile antennas.

3. Interference

Real time co-channel interferences, reduction of CCI- directional and Omni directional
reduction of CCI- Non co-Channel interference- Near end and far and interference – cross
talk- Hand Off- Frequency management and channel assignment.

4. Adjusting the Parameter of a System

Coverage hole filler- Leaky feeder- Cell splitting- Micro Cells- Separation between high way
cell sites.

5. Cellular Related Topics

Study of 00 GHz system- Cellular Telecommunication systems McGraw Hill International
Edition, 1990.

William C. V. Lee. Mobile Communication Engineering, McGraw Hill, 1982.

Reference Books:

Stephen W.Gibson, Cellular Mobile Radio Telephones Prentice Hall, Inc. Englewood Cliffs
New Jersey 07632, 1987;

W.C. Jakes, Microwave Mobile Communication, Wiley, New York, 1975.

RM-031 Research Methodology

UNIT I

Introduction to Research Methods

Defining and formulating the research problems. Important of literature review in problem definition, Philosophy of Science, Evolutionary Epistemology, Scientific Methods, Hypotheses Generation and Evaluation, Code of Research Ethics, Definition and Objectives of Research, Various Steps in Scientific Research, Types of Research; Research Purposes - Research Design - Survey Research - Case Study Research.

UNIT II

Data Collection and Sampling Design

Sources of Data: Primary Data, Secondary Data; Procedure Questionnaire- Survey and Experiments – Design of Survey and Experiments - Sampling Merits and Demerits - Control Observations - Procedures - Sampling Errors. Use of statistical packages in data analysis

UNIT III

Statistical Modeling and Analysis, Time Series Analysis

Probability Distributions, Fundamentals of Statistical Analysis and Inference, Multivariate methods, Concepts of Correlation and Regression, Fundamentals of Time Series Analysis and Spectral Analysis, Error Analysis, Applications of Spectral Analysis.

UNIT IV

Reporting and thesis writing – Structure and components of scientific reports - Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables
- Bibliography, referencing and footnotes - Oral presentation – Planning – Preparation – Practice – Making presentation – Use of visual aids - Importance of effective communication –.

UNIT V

Application of results and ethics - Environmental impacts - Ethical issues - ethical committees - Commercialisation – Copy right – royalty - Intellectual property rights and patent law – Trade Related aspects of Intellectual Property Rights – Reproduction of published material – Plagiarism - Citation and acknowledgement - Reproducibility and accountability.

Text Book

1. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006.
2. Bendat and Piersol, Random data: Analysis and Measurement Procedures, Wiley Interscience, 2001.
3. Shumway and Stoffer, Time Series Analysis and its Applications, Springer, 2000.
4. Jenkins, G.M., and Watts, D.G., Spectral Analysis and its Applications, Holden Day, 1986.
5. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
6. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.
7. Trochim, W.M.K., 2005. Research Methods: the concise knowledge *base*, Atomic Dog Publishing. 270p.
8. Wadehra, B.L. 2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.

Reference Books

1. Richard I Levin and David S. Rubin, Statistics for Management, 7/e. Pearson Education, 2005.
2. Donald R. Cooper, Pamela S. Schindler, Business Research Methods, 8/e, Tata McGraw-Hill Co. Ltd., 2006.

Additional reading

1. Anthony, M., Graziano, A.M. and Raulin, M.L., 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.
2. Carlos, C.M., 2000. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York.

3. Coley, S.M. and Scheinberg, C. A., 1990, "Proposal Writing", Sage Publications.
4. Day, R.A., 1992. How to Write and Publish a Scientific Paper, Cambridge University Press.
5. Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications
6. Leedy, P.D. and Ormrod, J.E., 2004 Practical Research: Planning and Design, Prentice Hall.
7. Satarkar, S.V., 2000. Intellectual property rights and Copy right. Ess Ess Publications.

Mode of Evaluation: Evaluation by the course teacher – Internal Assessment (25% Marks) / Term end examination (50% Marks).