**Scheme and Structure for Teaching Schedule and Examination**
**For M.Tech. in Electronics & Communication Engineering**

Semester – I

| S. No. | Course No. | Subject | Teaching Schedule | | | | Examination Schedule | | | Duration of Exam. (Hours) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Tot. Hrs. | Theory / Prac. | I.A. | Total | |
| 1. | MTEC-1.1 | Digital Communication Systems | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 2. | MTEC-1.2 | Digital Signal Processing | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 3. | MTEC-1.3 | Basics of State-Variable Techniques | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 4. | MTEC-1.4 | Stochastic Methods | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 5. | MTEC-1.5 | Communication Laboratory | - | - | 2*3 | 6 | 60 | 40 | 100 | 4 |

Semester - II

| S. No. | Course No. | Subject | Teaching Schedule | | | | Examination Schedule | | | Duration of Exam. (Hours) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Tot. Hrs. | Theory / Prac. | I.A. | Total | |
| 1. | MTEC-2.1 | Information Theory and Coding | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 2. | MTEC-2.2 | Optical Communication | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 3. | MTEC-2.3 | Wireless and Mobile Communication | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 4. | MTEC-2.4 | Elective | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 5. | MTEC-2.5 | DSP Laboratory | - | - | 2*3 | 6 | 60 | 40 | 100 | 4 |

**Elective (one of the following)**

**MTEC-2.4 (i) Satellite Communication**
**MTEC-2.4 (ii) Neural Networks**
**MTEC-2.4 (iii) DSP Architecture and Applications**

Semester - III

| S. No. | Course No. | Subject | Teaching Schedule | | | | Examination Schedule | | | Duration of Exam. (Hours) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | Tot. Hrs. | Theory / Prac. | I.A. | Total | |
| 1. | MTEC-3.1 | Data Communication | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 2. | MTEC-3.2 | Advanced Digital Communication Systems | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 3. | MTEC-3.3 | Current Literature Report and Seminars | 3 | 1 | - | 4 | 60 | 40 | 100 | 3 |
| 4. | MTEC-3.4 | Advanced Communication Laboratory | - | - | 2 * 3 | 6 | 60 | 40 | 100 | 4 |

**Semester – IV**

**Dissertation 1/2 H/S/2 Time: 10 Hrs. Report: Accepted/Rejected**

1) The Syllabus for each theory papers will contain four units and the examiner will set eight questions by selecting two questions from each unit. The student will answer five questions in all selecting at least one from each unit.

2) The Internal assessment in each theory paper will be of 40 marks of which 30 marks will be assigned on the basis of two testes and 10 marks will be assigned on the basis of Assignments/Seminars.

3) External as well as internal examiner will examine dissertation report and the recommendations will be either accepted / rejected.

**Master of Technology (Electronics & Communication Engineering)**

## DIGITAL COMMUNICATION SYSTEMS
## MTEC 1.1

LTP
310

Exam : 60
Sessional : 40
Time : 3 Hours

INSTRUCTIONS: There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit. All questions will carry equal marks.

Unit 1: REPRESENTATION OF BANDPASS SIGNAL AND SYSTEM
Response of a band pass system to band pass signal, Representation of band pass stationary stochastic processes, Representation of digitally modulated signals.

Unit2: MODULATION AND DEMODULATION FOR THE ADDITIVE GAUSSIAN NOISE CHANNEL: Representation of signal waveforms and channel characteristics, optimum demodulation for completely known signal in additive Gaussian Noise, Binary signaling in an AWGN Channel. Mary orthogonal Signaling in an AWGN Channel, Multiphase Signaling Waveforms, combined multiple phase and multiple amplitude waveforms, Carrier recovery for coherent demodulation.

Unit3: DETECTION: Optimum demodulation for signal with random phase in additive Gaussian noise, Non-Coherent Detection of binary singal in an AWGN channel, Non coherent detection of M-ary orthogonal signal in an AWGN channel.

Unit4: DIGITAL SIGNALLING OVER A CHANNEL WITH INTERSYMBON, INTEREFENCE AND ADDITIVE GAUSSIAN NOISE: Signal design for band limited channels, optimum demodulation for ISI and additive white Gaussian noise linear equalization Feedback equalization.

Books:


1. Simon Haykin: Communication System, Wiley Eastern Ltd. Ed 1998
2. J.Dassm SK Mullick & PK Chatterjee: Principle of Digital Communication, Wiley Eastern Ltd.
3. Martin S. Roden: Digital and Data Communication System P.H.I. London, Ed. 1998
4. Viterbi, A.I. and J.K. Qmura: Principles of Digital Communication, McGraw Hill Company, New York.

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## DIGITAL SIGNAL PROCESSING
## MTEC 1.2

LTP
310

Exam : 60
Sessional : 40
Time : 3 Hours

INSTRUCTIONS: There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit. All questions will carry equal marks.

Unit 1: DISCRETE – TIME DESCRIPTION OF SIGNALS & SYSTEMS:

Discrete-time sequence, response sequence, time invariant systems, stability and causality criterion for discrete-time systems, linear constant coefficient difference equation, properties of real valued sequences, convolution , correlation.

Unit2: THE Z-TRANSFORM

Sampling, Definition of Z-transform, Properties of Z-transform, The complex Z- plane, Region of Convergence in the Z-plane, Evaluation of Z-transform, Relation between FT & Z-Transform, The Z-transform of Symmetric sequence, The Inverse Z-transform. The systems function of a digita.

Unit3: THE DISCRETE FOURIER TRANSFORM (DFT)

Definition, its properties, DFT, IDFT pair, circular conviction, Computations for evaluating the DFT, FFT algorithm, Analytic derivation of the "decimation – in – time FFT algorithm" , Some general observations on the FFT.

Unit4: INFINITE IMPULSE RESPONSE (IIR) FILTER DESIGN TCHNIQUES:

Introduction, Analog filter system function & frequency response, Analog low pass filter design techniques for Butterworth Chebyshev Type-I and Type-II filters, Impulse invariance and Bilinear Transformation methods to convert Analog filters into Digital Filters. Transformation for converting low pass filters into other types.

FINITE IMPULSE RESPONSE (FIR) FILTER DESIGN TECHNIQUES:

Introduction, Designing FIR filters by DFT method and frequency sampling method. Study of windows (Rectangular, Triangular, Hamming and Kaiser). Designing FIR filters with the windowing methods.

DIGITAL FILTER STRUCTURE:

The direct form I & II structures, Cascade & parallel combination of $2^{nd}$ order sections.

Books:


1. J.G. Proakis and D.G. Manolakis: Digital Signal Processing, 1995 (PHI) III, Edition.
2. A. Oppenheim, R.Schafer and J.Buch: Discrete Time Signal Processing, 1996 (PHI) VI, Edition.
3. L. Rabiner and B.Gold, Theory and Application of Digital Signal Processing, 1975, Prentice Hall of India.

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## BASICS OF STATE-VARIABLE TECHNIQUES
## MTEC 1.3

| | |
|---|---|
| LTP | Exam : 60 |
| 310 | Sessional : 40 |
| | Time : 3 Hours |

INSTRUCTIONS: There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit. All questions will carry equal marks.

Unit 1: MATRIX ALGEBRA AND LINEAR SPACES: Upper and lower triangular, symmetric matrices, various operations on matrices, eigenvalues and eigenvectors, similarity transformation, modal matrix, companion form, diagonal form, Cayley-Hamilton theorem, matrix funcjtions, vectors, linear spaces, basis, orthonormal basis, norms and their properties, singular value decomposition (SVD).

Unit 2: STATE SPACE TECHNIQUES: Definition of state, state variables, state vectors, simulation of differential equations and transfer funcjtions, obtaining state equation from simulation, canonical forms (controllable, observable and Jordan (diagonal) canonical forms), solution of state equations, transfer function from state equations, controllability, observability.

Unit 3: LYAPUNOV STABILITY: Positive (Negative) deminite and semidefinite scalar functions, quadratic forms, nonlinear systems, equilibrium points, limit cycles, Lyapunov function, various definitions of stability, stability theorems, Eyapunov equajtion for linear time-invariant system.

Unit4: DISCRETE-TIME SYSTEMS: Difference equation for LTI systems, state equation, solution of state equation, Jury's stability test, Lyapunov stability and Lyapunov equation.

Books:


1. M.Gopal, Modern Control System Theory, 2nd Edition New Age International (P) Limited, 2004
2. K. Ogata, Modern Control Engineering, Prentice-Hall of India
3. B.C. Kuo, Digital Control Systems, 2nd Edition, Oxford University Press.

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## STOCHASTIC METHODS
## MTEC 1.4

| | |
|---|---|
| LTP | Exam : 60 |
| 310 | Sessional : 40 |
| | Time : 3 Hours |

INSTRUCTIONS: There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit. All questions will carry equal marks.

Unit 1: RANDOM VARIABLES: Probability Bay's rule, Distribution function, Discrete randon vectors, different distributions, jointly distributed random variables, order statistics, Distribution of sums, expectations, moments, transform methods mean time to failure, Inequalities and limit theorems, Mixture distribution, Conditional expectations, Imperfect fault coverage & reliability, Random sums.

Unit2: STOCHASTIC PROCESSES: Classification Bernoelli process, Poisson process, Renewal processes, available analysis, Random incidence, renewal model of program behavior.

Unit3: MARKOV CHAINS: n-step transition probabilities, limiting distribution, distribution of times between state changes, irreducible finite chains with a periodic states, the m/g/I, queueing system discrete parameter, Birth Data Processes, Markov chains with absorbing states, Birth and death processes, Non-Birth Death Processes

Unit4: NETWORK OF QUEUES: Open and close queuing networks, Non exponential service item distributions and multiple job type, non product form networks
Correlation & Regression: Introduction, least squares curve fitting, Coefficient of determination, Confidence of intervals in linear regression, conclaition analysis, non linear regression, Analysis of variance.

Books:


1. Papoulis, A., Probability, Random Variables and Stochastic Processes, Third Edition, McGraw Hill.
2. K.S. Trivedi: Probability and Statistics, PHI, 3rd Ed.
3. S.P. Gupta, Statistical Methods, Sultan Chand and Sons
4. V.K. Kapoor and S.C. Gupta, Fundamentals of Statistics, Sultan Chand and Sons

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## DIGITAL COMMUNICATION LABORATORY
## MTEC 1.5

| L | T | P | Exam : 60 |
|---|---|---|---|
| 0 | 0 | 6 | Sessional : 40 |
| | | | Time : 3Hrs. |

### Experiment List

1. To study the PCM Modulation & Demodulation Characteristics.
2. To study the characteristics of ASK Modulation & Demodulation Techniques.
3. To study the characteristics of PSK Modulation & Demodulation Techniques.
4. To study the characteristics of FSK Modulation & Demodulation Techniques.
5. To study the characteristics of QPSK Modulation & Demodulation Techniques.
6. Develop software to get the different pattern of Gaussian function by varying the standard deviation ( Cr ) from 1 to 5 , using MATLAB.
7. Develop software to get the different pattern of Rayleigh function by varying the Rayleigh constant ( J.1 ) from 1 to 5 , using MATLAB.
8. To construct a BSC for the different values and compare the results using Commsim.
9. To establish Audio Video satellite link between Transmitter and Receiver.
10. To measure frequency & level of a unknown signal using Spectrum analyzer.
11. To measure harmonics of sine wave using Spectrum analyzer.
12. To observe Audio video modulated signal with any one channel on spectrum analyzer.

**Electronics and Communication Engg.**
**Information Theory & Coding**
MTEC 2.1

| L | T | P | Exams: 60 |
|---|---|---|---|
| 3 | 1 | 0 | Sessionals : 40 |
| | | | Tims: 3 Hours |

**INSTRUCTIONS:**
There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit, all questions will carry equal marks.

**Unit- I Basic Concepts of Information Theory:**
A measure of uncertainty, binary sources, measure of information for two-dimensional discrete finite provability scheme, noise characteristics of channel, Basic relationship among different entropies, Measure of mutual information channel capacity. Capacity of channel with symmetric noise structure BSC and BEC.

**Unit – 2 : Elements of Encoding**
Purpose of encoding separable binary codes, Shannon Fano encoding. Noiseless coding theorem of decidability, MC Millen's Theorem, Average length of encoding message, Shannon's Binary encoding, Fundamental Theorem of discrete Noiseless coding, Huffman's Minimum Redundancy codes.

**Coding for reliable Digital Transmission of Storage:**
Introduction, types f codes, Modulation and derriodulation, Maximum likelihood decoding, types of error, error control strategies.

**Unit – 3: Introduction to Algebra:**
Groups, Fields binary field Arithmetic, construction of Galois Field GF (2m), Basic properties of Galois Field GF(2m), Vectar Spacer, Matrices.

**Linear Block Codes:**
Introduction to Linear Block Codes, Syndrome and Error detection, Minimum distance of block code, error detecting and error correcting capabilities of block codes Hamming. Code.

**Cyclic Codes:**
Description of Cyclic codes, Generator and parity check matrices of cyclic codes, encoding of cyclic codes Syndrome computation & error detection decoding of cyclic codes, Error trapping decoding of cyclic codes, Goley codes.

**Unit-4: BCH Codes:**
Description of codes, Decoding of BCH codes, implementation of Galoes Fields Arithmetic, Implementation of error correction.
**Convolutional codes:**

Encoding of convolution codes, structural properties of convolution codes. Distance properties of conventional codes, distance properties of convolutional codes, Maximum likelihood decoding of convolutional codes.
Automatic repeat request Strategies: Stop and wait go back and selective repeat ARQ strategies, Hybrid ARQ Schemes.

**Books:**


1. F. M. Reza: information theory. McGraw Hill.
2. ShuLin & J co#steib: Error control Coding, PHI
3. Dass, Mullick & Chatterjee: Digital Communication, John Wiley; Ed. 1992.

**Electronics and Communication Engg.**
**Optical Communication**
MTEC 2.2

| L | T | P | Exams: 60 |
|---|---|---|---|
| 3 | 1 | 0 | Sessionals : 40 |
| | | | Tims: 3 Hours |

**Instructions:**
There shall be eight questions in total, two from each unit. Students are require to attempt five question selecting atleast one from each unit. All questions will carry equal marks.

**Unit – 1 Introduction:**
Advantage of optical fiber communication, Elements of fiber communication link Ray theory and electromagnetic mode theory for optical propagation, step index and graded index fiber numerical aperture.

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

**Unit-2: Optical Sources:**
Basic concepts; LED for optical communication, Burrus type double hetro structure, surface emitting LEDs, shape geometry, Edge emitting LEDs LED to fiber Launch system semiconductor laser theory, modulation ad characteristics, Fabry- Perot lasers quantum will and distributed feed back lasers.

**Photo Detectors:**

P-I-N Photo diodes: Theory and their characteristics Avalanche Photo detectors. Theory and their bandwidth noise in APD.

**Unit-3: Optical fiber communication systems:**
Optical transmitter circuit; LED and laser drive of optical circuit, structure, preamplifier, AGC equalization, optical power budge loading, Analog systems; analog modulation, Direct modulation, Sub carrier mode Distribution system, optical TDMK, Sub Carrier multiplexing, WDM.

**Unit- 4: coherent Systems:**
Coherent receivers, homody ne and heterodyne detection, noise in receiver, polarization control, Homodyne receiver, reusability and laser linewidth,

Heterodyne receiver, Synchronous, Asynchronous and self synchronous demodulation, phase diversity receiver.

**Books:**


1. John Grover: Optical communication System, PHI.
2. Gerd Keiser: Optical Fiber Communication, 2nd Ed. Tata Mc Graw-Hill
3. Franz Jh & Jain VK, Optical Communication, Narosa Pub.

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## WIRELESS MOBILE COMMUNICATION
## MTEC 2.3

LTP
310

Exam : 60
Sessional : 40
Time : 3 Hours

INSTRUCTIONS: There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit. All questions will carry equal marks.

Unit 1: Mobile Radio system: Introduction to mobile radio system, Paging systems, cordless telephone system, Cellular telephone systems- Cellular concept, frequency reuse, channel assignment strategies, interference and system capacity, trucking and grade of service, cell splitting, sectoring, microcell zone concept, HO strategies.

Unit 2: Mobile Radio Propagation : mechanism, free space path loss, long distance path loss models, Okukara model, PCS model, Wideband model, Multipath characteristics of radio waves, signal fading, time dispersion, Doppeler spread, coherence time LCR, fading statistics, diversity techniques.

Unit3:SPREAD SPECTRUM COMMUNICATION: Introduction to spread spectrum communication, multiple access techniques used in mobile wireless communication: FDMA / TDM / CDMA, Cellolar CDMA, packet radio protocols, CDMA, reservation protocols, capacity of cellular CDMA, soft HO.

Unit4:WIRELESS SYSTEMS: Wireless systems and standards – GSM standard signaling and call control, mobility management location tracing, wireless data networking ,packet error mode line on fading channels, performance analysis of link and transport layer protocols over wireless protocols over wireless channels, mobile data networking (mobile IP) , wireless data services, IS-95,GPRS.
Books:


1. W.C.Jakes: microwave Mobile Communication,IEEE Press
2. T.s. Rappaport: wireless Communication: Priaciples, Prentice Hall 1996
3. William C.y.Lee: Mobile Cellular Telecommunications,Analoge and Digital systems ,McGraw hill – 1995
4. Kaveh Pahlavan & Allen H. Levesque : Wireless Information Networks, Wiley series in Telecommunications and signal processing.

5. Karnilo Feher: Wireless Digital Communications, Modulation and Spread Spectrum Applications. PHI, 2001

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## SATELLITE COMMUNICATION
## MTEC 2.4 (i)

LTP 310

Exam : 60
Sessional : 40
Time : 3 Hours

INSTRUCTIONS: There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit. All questions will carry equal marks.

Unit 1: Introduction: Satellite communication, Brief History, Orbits of satellite: Low, medium and geo-synchronous main characteristics, Angle period, Returning period, Angle of Evaluation, Propagation Delay, Orbital spacing.

Unit 2: Satellite Links: Delay transponder, Earth Stations, Antennas and Earth Coverage, Altitude and eclipses.

Unit 3: Earth space propagation effects: Frequency window, Free space loss, Atmospheric absorption, Rainfall Attenuation, Inospheric scintillatin, Telemetry, Tracking and command of satellites.
Detection: QPSK offset QPSK and MSK, Coherent and non-coherent detection, error rate performance.

Unit4: Synchronization: Principle and techniques, Multiple Access Techniques, FDMA SPADE system, TDMA system, Concept and configuration, system timing frames format, SSMA Basu Principles, VSAT, Random Access, space communication, link design description of operational in TELSAT and INSAT system.

Books:


1. J. Martin : Communication Satellite System, PH Englewood
2. D.C. Aggarwal: Satellite Communication, Khanna Pub.
3. Tri ha Digital Satellite Communication Tata Mc Graw Hill
4. Harry and Vam Trees: Satellite Communication, IEEE Proceeding, 1979.

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## NEURAL NETWORKS
## MTEC 2.4 (ii)

| | |
|---|---|
| LTP | Exam : 60 |
| 310 | Sessional : 40 |
| | Time : 3 Hours |

INSTRUCTIONS: There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit. All questions will carry equal marks.

Unit1: Introduction: Biological neurons and memory: Structure and function of a singla neuron; Artificial Neural Networks (ANN), Typical applications of ANNs; Classification, Clustering, Vector quantization, Function Approximation, Basic Approach to the working of ANN-Training, Learning and Generalization.

Unit2: Supervised Learning: Single-layer networks; perception, Linear separbility, Training algorithm, Limitations; Multilayer, networks-architecture, back propagation algorithm (BPA) and other training algorithms; Recurrent Networks; Feed-forward Networks; Radial-Basis-Function (RBF).

Unit3: Unsupervised Learrning : Winner-takes-all networks; Hamming networks; Simple competitive learning; Kohonen's Self-organizing Maps; Principal Component Analysis.

Unit4: Associated Models: Hopfield Networks, Brain-in-a-Box network; Boltzmann machine.

Optimization Methods: Hopfield Networks for TSP, solution of simulataneous linear equations; Iterated Gradient Descent; Simulated annealing; Genetic Algorithm.

Text/ References:


1. K. Mehrotra, C.K. Mohan and Sanjay Ranka, Elements of Aritifical neural Networks, MIT, 1997.
2. Simon Haykin, Neural Networks – A Comprehensive Foundation, Macmillan Pub. Co. New York, 1994
3. A. Clichocki and R. Unbehauen, Neural Networks for Optimization and Signal Processing, John Wileyand Sons,1993.
4. J.M. Zurada, Introduction to Artificial Neural Networks (Indian Edition) Jaico Publishers, Mumbai, 1997.

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**DSP LABORATORY**

**MTEC 2.5**

| L | T | P | Exam : 60 |
|---|---|---|---|
| 0 | 0 | 6 | Sessional : 40 |
| | | | Time : 3 Hours |

**Experiment List**

1. Familiarization with some MATLAB commands used in DSP Lab.
2. Computation of FFT and IDFT of given sequences and verifying the results by actual calculations.
3. Using MATLAB design Butterworth Filter for given specifications:
   (i) Find minimum order of the filter for the given specifications.
   (ii) Design analog filter to satisfy specifications.
   (iii) Obtain frequency response of the designed analog filter.
4. Using MATLAB design Chebyshev Type-I filter to satisfy given specifications and verify the result by manual design of analog filter and discretizing it using bilinear transformation of MA TLAB.
5. Using MATLAB design Chebyshev Type-II filter to satisfy given specifications and verify it by manual design & observe response on spectrum analyzer..
6. Study of window characteristics of Rectangular, Triangular, Hamming and Kaiser windows for various parameters using wintool.
7. Design FIR filter for given specifications using Hamming and Kaiser windows using fdatool and verifying the results manually & observe response on spectrum analyzer.
8. Using MATLAB discretize the Butterworth filter designed in Expt 3. by
   i) Impulse Invariance technique
   ii) Bilinear technique
   iii) Manually obtained Butterworth Filter of expt 3 and discretize it by Impulse invariance & bilinear techniques using MATLAB & compare the results with above
9. To study spreading & dispreading using additive white Gaussian noise generator & frequency offset on a CDMA trainer .
10. To study spreading & dispreading using external NRZ on board data.
11. To study different types of Antenna.

**Master of Technology (Electronics & Communication Engineering)**
**DATA COMMUNICATIONS**
**MTEC 3.1**

LTP
310

Exam : 60
Sessional : 40
Time : 3 Hours

INSTRUCTIONS: There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit. All questions will carry equal marks.

Unit1: INTRODUCTION: A Communication model, Data Communication, Data Communication Networking, Feed for Protocol Architecture. A Simple Protocol Architecture, OSI Model, the TCP/IP Protocol Architecture.

Unit2: DATA COMMUNICATIONS: Concepts, Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity, Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line of Sight Transmission.

Signal Encoding Techniques: Digital Data, Digital Signals; Digital Data, Analog Signals; Analog Data, Digital Signals, Analog Data, Analog Signals.

Unit3: DIGITAL DATA COMMUNICATION TECHNIQUES: Asynchoronous and Synchronous Transmission, Types of Errors, Error Detection, Error correction, Line Configurations, Interfacing.

Data Link Control: Flow control, Error Control, High-level data control.

Multiplexing: Multiplexing using frequency division, Synchronous Time Division and Statistical Time Division, Asymmetric Digital Subscriber Line, Xdsl.

Spread Spectrum: The concept of Spread Spectrum, Frequency-Hoping and Direct Sequence Spread Spectrum, Code-Division Multiple Access.

Unit4: WAN AND LAN:

WAN: Circuit Switching and Packet Switching : Switching Networks, Circuit-Switching Networks, Circuit-Switching Concepts, Control Signaling, Soft switch Architecture, Packet-Switching Principles, X-25, Frame Relay

Asynchoronous Transfer Mode: Protocol Architecture : ATM Logical connections, ATM Cells, Transmission of ATM Cells, ATM Service Categories, ATM Adaptation Layer.

LAN: Background, Topologies and Transmission Media, LAN Protocol Architecture, Bridges, Layer 2 and Layer 3 Switches.

Text Books:

1. W Stalling, Data and Computer Communications, Prentice Hall of India, 1997.

Reference Books:

2. R G Gallager and D Bertsekas, Data Networks, Prentice Hall of India 1992
3. M Deprycker, ATM-solutions for Broadband ISDN, Prentice-Hall of USA, 1995

**Master of Technology (Electronics & Communication Engineering)**
**ADVANCE DIGITAL COMMUNICATION SYSTEM**
**MTEC 3.2**

| LTP | Exam : 60 |
|---|---|
| 310 | Sessional : 40 |
| | Time : 3 Hours |

INSTRUCTIONS: There shall be eight questions in total, two from each unit. Students are required to attempt five questions selecting at least one from each unit. All questions will carry equal marks.

Unit 1: INTRODUCTION: Geometric representation of modulation signals, Linear modulation techniques, $\pi/4$ QPSK, Offset, QPSK, Constant envelop technique, MSK, GMSK, Linear & constant envelop modulation technique, M-ary PSK, M-ary QAM.

Unit2: Spread spectrum system line DS-Spread Spectrum, Pseudo noise sequences, Performance of DS-SS, Frequency Hopping system, Modulation Error performance for Binary signal in AWGN, Detection of M-ary, orthogonal, M-ary orthognaling with non-coherent detection.

Unit3: Equalization: Adaptive equalizer, Linear Equalizer, Nonlinear Equalizer, ISI interference, RAKE receiver, Maximum likelihood sequence estimation (MLSE) equalizer.

Unit4: Railey fading distribution, Ricean fading distribution, Speech coding, Characterization of speech signals, Vector quantization, Adaptive quantization, Power spectrum for general memory less modulation.

Books:


| | | | |
|---|---|---|---|
| 1. | Stephen G. Wilson | : | Digital Modulation and Coding, Pearson Education (Singapore) pvt. Ltd. |
| 2. | T.S. Rappaport | : | Wireless Communications, Pearson Education (Singapore) Pvt, Ltd. |
| 3. | Proakis, J.G. | : | Digital Communication, McGraw Hill, 1995 |
| 4. | Hykin, S | : | Digital Communication, Wiley |

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## ADVANCE COMMUNICATION LABORATORY
## MTEC 3.4

| L | T | P |
|---|---|---|
| 0 | 0 | 6 |

**Exam : 60**
**Sessional : 40**
**Time : 3 Hours**

### Experiment List

1. Plot the power spectrum pattern of the Gaussian minimum Shift Modulator (GMSK), using Commsim Software & also compare the result of this pattern by varying the carrier frequency.
2. Plot the attenuated signal pattern, when the signal is propagated over a long distance (Km.), using Commsim Software.
3. Develop software to get the free space path loss proposition by varying the distances between the transmitter & receiver & compare the result graphically using the MATLAB
4. Develop software to get the different pattern of Rayleigh function by varying the standard deviation (0) from 1 to 5, using the MATLAB
5. Develop software to get the different pattern of Rayleigh function by varying the Rayleigh constant ( ) from 1 to 5, using the MATLAB
6. Plot the Doppler fading power spectrum pattern & compare the result by varying the Doppler frequency shift. Using Commsim software.
7. Get the output of convolutional encoder & decoder, also compare the result by varying the PN sequences graphically, using the commsim software.
8. Generate the blue tooth GFSK (Gaussian frequency shift keying) base bank signal by using the commsim software.
9. Plot the output pattern of MSK (Minimum shift keying) & compare the result graphically by varying the carrier frequency, using the Commsim software.
10. To study variation in the radiation strength at a given distance from the antenna.
11. To construct Trellis encoder & decoder for different values and compare them using Commsim .