

ADVANCED COMMUNICATION TECHNIQUES

MODULE-I

Digital Modulation Scheme : Representation of Digitally Modulated Signals, MSK, GMSK, Memoryless Modulation Methods; Quadrature Amplitude Modulation, Multidimensional Signaling. Signaling Schemes With Memory; Continuous-Phase Frequency-Shift Keying, Continuous-Phase Modulation. Power Spectrum of Digitally Modulated Signals; Power Spectral Density of a Digitally Modulated Signal With Memory, Power Spectral Density of Linearly Modulated Signals, Power Spectral Density of Digitally Modulated Signals With Finite Memory, Power Spectral Density of Modulated Schemes With a Markov Structure, Power Spectral Density of CPFSK and CPM Signals, Overview of AWGN Channel

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, The Phase-Locked Loop, Effect of Additive Noise in the Phase Estimate. Symbol Timing Estimation; Maximum Likelihood Timing Estimation.

MODULE-II

Multichannel and Multicarrier Systems: Multichannel Digital Communications in AWGN Channels; Binary Signals, M-ary Orthogonal Signals. Multicarrier Communications; Single Carrier versus Multicarrier Modulation, Capacity of a Nonideal Linear Filter Channel, OFDM, Modulation & Demodulation in an OFDM, An FFT Algorithm Implementation of an OFDM System.

Principle of multi path propagation, Impulse response model of channels, parameters for mobile multi path channels, concept of fading, Rayleigh and Ricean fading; simulation of fading channels.

Spread spectrum modulation techniques, Equalization Technique – Linear equalizer and Nonlinear equalization, algorithms for adaptive equalization, Multiple Access Techniques: Spread Spectrum Multiple Access – Frequency Hopped multiple Access (FHMA), Code Division Multiple Access (CDMA). Space Division Multiple Access (SDMA), Spectral efficiency of different access technologies, Packet ratio protocols – ALOHA, carrier sense Multiple Access (CSMA/CD, CSMA/CA), Packet reservation Multiple Access (PRMA).

MODULE-III

Error Control Coding: Linear Block Codes: Introduction, Basic definition, equivalent codes, parity - check matrix, decoding, syndrome decoding, Perfect Codes, Hamming Codes, Optimal Linear codes.

Convolution Codes : Introduction, Tree Codes and Trellis Codes, Polynomial description, The Generating function, Matrix Description, Viterbi Decoding, Distance bounds, Turbo Codes, Turbo Decoding.

Trellis Coded Modulation (TCM): Introduction, the concept of coded modulation, Mapping by set Partitioning, Design rules, TCM Decoder.

Coding for Secure Communication, Cryptography : Introduction, encryption techniques, Symmetric cryptography, data encryption standard, Asymmetric Algorithm the RSA Algorithm.

MODULE-IV

Antenna Transmission lines, Micro-strip lines, Wave guides, Microwave networks, Microwave resonator, Electromagnetic wave Generation Process, Microwave Amplifiers and oscillators, Scattering of electromagnetic waves; Aperture antennas, active antennas, GTD/UTD techniques and its applications to horn and reflector antennas. Broadband antennas. Antenna measurements: Test ranges, near field and far field techniques.

Text Books:

1. Wireless Communications by T. S. Rappaport, 2nd Edition, Pearson Education.
2. Wireless Communications & Network 3G and beyond Itisaha Mishra, Tata Mc-Graw Hill Education Pvt. Ltd.
3. Mobile cellular Telecommunications by W. C. Y. Lee, 2nd Edition, McGraw Hill.
4. W C Y Lee; *Mobile Communication Engineering*, Tata McGraw Hill, India, 2008
5. Ranjan Bose, Information Theory, Coding and Cryptography, 2nd Edn., Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2008. ISBN-10: 0-07-066901-5, ISBN-13: 978-0-07-066901-7.
6. John G. Proakis and Masoud Salehi, *Digital Communication*, McGraw-Hill, 5th Edition
7. D.M. Pozar, Microwave Engineering, John-Wiley, 2004.

Reference Books:

1. Wireless Communication by T. L. Singal, Tata Mc-Graw Hill Education Pvt. Ltd.. Wireless Communication and Networks by V. K. Garg, Elsevier.
2. 3G Networks by SumitKasera&NishitNarang, Tata McGraw Hill. Simon Haykin, *Digital Communication*, Willy
3. Tube & Schilling, *Principle of Communication*, PHI
4. R.S. Elliott, Antenna Theory & Design, Wiley-IEEE Press, 2003.

TENTATIVE
Likely to be modified