

## EC 7201 MOBILE & CELLULAR COMMUNICATION

### MODULE- I

**Mobile Communication Systems & Standards:** Evolution of Mobile Radio Communications, Elements of cellular communication systems, Different generations of Cellular Networks, Introduction to GSM, GPRS, UMTS, WLAN, WLL, Bluetooth, PAN.

### MODULE- II

**The Cellular Concept:** Frequency Reuse, Hand-off strategies, Schemes to enhance cellular system capacity and range extension, Spectral efficiency.

### MODULE- III

**Mobile Radio Interferences & System Capacity:** Co-channel interference and Adjacent channel interference, Power control, Inter-symbol interference, Interference and system capacity.

### MODULE- IV

**Propagation & Fading:** Free-space propagation model, Propagation path loss, Outdoor propagation models (Okumura model & Hata model), Indoor propagation models (Partition Losses in the same floor and between floors), Multipath fading, time dispersive and frequency dispersive channels, delay spread and coherence bandwidth, LCR and ADF.

### MODULE- V

**Diversity & Combining Techniques:** Diversity Schemes (Space, frequency, field and polarization diversities) and combining techniques.

### MODULE- VI

**Antenna Design Parameters:** Antennas used for Mobile Communications, Radiation patterns, smart antenna (basic concept), Antenna location, Spacing and height.

### MODULE- VII

**Multiple Access Techniques:** FDMA, TDMA, CDMA, SDMA, OFDM, DS-CDMA, FH-CDMA, TH-CDMA, Capacity of Cellular CDMA.

### Text Book:

1. Theodore S Rappaport, "Wireless Communication: Principles and Practice" Prentice Hall of India, New Delhi, 2006, 2/e.

### Reference Book:

1. William C. Y. Lee, "Mobile Communications Engineering" Tata McGraw Hills Education Pvt. Ltd., 2010, 2/e, (Indian reprint)

## EC 7203 ANTENNAS & PROPAGATION FOR WIRELESS COMMUNICATION

### MODULE – 1

**Radiation and Antennas:** Definition of antenna, Function of antenna, Properties of antennas, Network theorems, Basic antennas parameters and elements, Radiation mechanism, Radiation field, Power and Radiation Resistance, Radiation, induction and electronic field, Friis transmission formula, Hertzian dipole, Different current distribution in linear antennas, Radiation form half wave dipole and quarter wave monopole, Radiation characteristics of dipoles.

**Text Books:**

1. "Antennas and Wave Propagation", G.S.N. Raju, Pearson Education (Chapter -3)
2. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York.

### Module -2

**Linear Antennas Arrays:** Directional characteristics of dipoles, Radiation patterns of alternating current element, dipoles and monopoles, two element array, Uniform linear array, Broadside and endfire array, Array of non isotropic radiations, Principles of pattern multiplication, Binomial arrays.

**Array Synthesis:** Synthesis methods, Dolph Chebyshev methods.

**Text Books:**

1. "Antennas and Wave Propagation", G.S.N. Raju, Pearson Education (Chapter - 4 and Chapter - 5)
2. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York.

### Module: - 3

**HF, VHF and UHF Antennas:** Resonant and non – resonant antennas, LF Antennas, Antennas for HF, VHF and UHF, Dipole array, Broadside array, Endfire array, Folded dipole, Yagi-uda antenna, Log-periodic antenna, Loop antenna, Helical antenna.

**Text Books:**

1. "Antennas and Wave Propagation", G.S.N. Raju, Pearson Education (Chapter - 6)
2. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York.

### Module – 4

**Microwave Antennas:** Parabolic reflector, Types of Parabolic reflectors, Feed systems, Shaped beam antennas, Horn antennas, Slot antenna, Slot on the walls of rectangular waveguide, Babinet's principle.

**Text Book:**

1. "Antennas and Wave Propagation", G.S.N. Raju, Pearson Education (Chapter - 7)
2. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York.

### MODULE -5

**Microstrip Antennas:** Introduction, Advantages, Limitations, Feeding techniques, analysis using transmission line model and cavity model, Broadband Techniques.

**Text Book:**

1. "Antenna Theory and Design", C.A. Balanis, John Wiley & Sons, Inc.

### MODULE – 6

**Antennas for Special Applications:** Electrically and physically small antennas, Antennas for satellite communication, Architecturally acceptable antennas, Leaky wave antennas, Antennas for mobile communication, Antennas for GPR, UWB antennas.

**Text Book:**

1. "Antennas for All Applications", J.D. Kraus, McGraw Hill, New York. (Chapter-17)

### MODULE – 7

**Radio Wave Propagation:** Surface Wave, Space wave, Tropospheric wave propagation, Ducting, Ionosphere Layers, Ionosphere wave Propagation, MUF, Skip distance, Fading Effect of the Earth's magnetic field, LOS communication, Radio Horizon, Microwave frequency bands, Microwave link.

**Text Book:**

1. "Electromagnetic Waves and Radiating Systems", E. C. Jordan & K.G. Balmain, PHI.
2. "Electronic and Radio Engineering" F.E. Terman, McGraw Hill Ltd.
3. "Antennas and Wave Propagation, G.S.N. Raju, Pearson Education.

**Reference Books:**

1. " Antenna Analysis", Edward A. Wolf, John Wiley and Sons,
2. "Antenna Theory and Practice", Rajeshwari Chatterjee, IInd Edition, New Age International Ltd.

## EC 7205 TELECOMMUNICATION SWITCHING SYSTEMS & NETWORKS

### MODULE- I

**Switching in Telecommunication Systems:** Evolution of Telecommunications, General principle of switching, Classification of Switching Systems, Elements of Switching System, Signalling tones, DTMF, Common Control and Direct Control

**Text Book:**

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001

### MODULE- II

**Electronic Space Division Switching:** Stored Program Control (SPC), Centralised SPC, Distributed SPC, Enhanced Services, Two-Stage Networks, Three-Stage Networks.

**Text Book:**

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001 (Ch- 4)

### MODULE- III

**Time Division Switching:** Principle of Time Division Space Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Introduction to Combination Switching.

**Text Book**

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001.(Ch- 6)

### MODULE- IV

**Traffic Engineering:** Network Traffic Load and Parameters, Grade of Service and Blocking Probability, Modelling Switching systems, Erlang B formula, Delay Systems.

**Text Book:**

1. "Telecommunication Switching Systems", by T. Viswanathan, PHI, 2001. (Ch- 8)

### MODULE- V

**Integrated Services Digital Networks:** ISDN and its Motivation, New Services, Network and Protocol Architecture, Transmission Channels, Internetworking, BISDN.

**Text Book:**

1. "Telecommunication Switching Systems & Networks", by T. Viswanathan, PHI, 2001.(Ch- 11)

### MODULE- VI

**Telephone Networks:** Network Subscriber Loop Systems, Switching Hierarchy & Routing, Transmission Plan, Numbering Plan, National and International numbering schemes

**Text Books:**

1. "Telecommunication Switching Systems & Networks", T. Viswanathan, PHI, 2001. (Ch-9)
2. "Telecommunications Switching, Traffic and Networks", J. E. Flood, (Ch- 10), Pearson Education Asia, 2004

### MODULE- VII

**ATM Networks:** Introduction to Asynchronous Transfer Mode (ATM), Protocol, Architecture, ATM Logical Connection, ATM Cells, Transmission of ATM Cells, ATM Adaptation Layer, Traffic and congestion control

**Wireless Networks:** Introduction to Wireless Networks.

**Text Book:**

1. "Data & Computer Communications by William Stallings", 7/e, PHI. (Ch- 11 & 12).
2. "Wireless Communication-Principle and Practices". 2<sup>nd</sup> Ed. T. S. Rappaport, Pearson.

## **MEC 1125 INFORMATION AND CODING THEORY**

### **Module -1:**

#### **Introduction:**

Introduction to information theory & error control coding, Information measure, Entropy, Differential Entropy, Conditional Entropy, Relative Entropy, Information rate, Mutual Information, Channel Capacity.

### **Module- -2:**

#### **Source Coding:**

Shannon's Source Coding Theorem, Prefix Coding, Huffman Coding, Shannon-Fano Coding, Arithmetic Coding, Lempel-Ziv Algorithm, Rate Distortion Theory.

### **Module -3:**

#### **Channel Capacity & Coding:**

Channel Coding Theorem, Markov Sources, Discrete Channel with discrete Noise, BSC, BEC, Capacity of a Gaussian Channel, channel capacity for MIMO system, Bandwidth-S/N Trade-off.

### **Module -4:**

#### **Block Codes:**

Galois Fields, Hamming Weight and Hamming Distance, Linear Block Codes, Encoding and decoding of Linear Block-codes, Parity Check Matrix, Bounds for block codes, Hamming Codes, Syndrome Decoding.

### **Module -5:**

#### **Cyclic Codes:**

Introduction to cyclic code, Method for generating Cyclic Codes, Matrix description of Cyclic codes, Cyclic Redundancy Check (CRC) codes, Circuit implementation of cyclic codes, Burst error correction, BCH codes.

### **Module -6:**

#### **Convolutional Codes:**

Introduction to Convolutional Codes, Polynomial description of Convolutional Codes, Generating function, Matrix description of Convolutional Codes, Viterbi Decoding of Convolutional code, Introduction to Turbo Code.

### **Module -7:**

#### **Coding for Secure Communications:**

Introduction to Cryptography, Overview of Encryption Techniques, Secret-Key Cryptography, Data Encryption, Standard (DES), Public-Key Cryptography, RSA algorithm, Digital signature, One- way Hashing.

### **Text Books:**

1. "Information Theory, Coding & Cryptography", by Ranjan Bose, TMH, Second Edition.
2. "Communication Systems", by S. Haykin, 4th Edition, Wiley-Publication.

### **Reference Books:**

1. "Elements of Information Theory" by Thomas M. Cover, J. A. Thomas, Wiley-Interscience Publication.
2. "Error Correction Coding Mathematical Methods and Algorithms" by Todd K. Moon, Wiley-India Edition.
3. "Cryptography and Network Security", Fourth Edition, by William Stallings

MODULE-1

Introduction to business ethics, ethical principles in life, utilitarianism justice and fairness

MODULE-2

Social responsibility of business organisations

MODULE-3

Introduction to corporate governance

MODULE-4

Ethics of consumer protection, relevance of ethics in marketplace

MODULE-5

.Business and its internal constituencies, employee issues

MODULE-6

Indian value system and its utility in present context

Module-7

Roles and responsibilities of an individual in the present social context.

TEXT BOOKS:

1. Business Ethics concept and cases: Valesquez -TMH Publication
2. Human Values-A.N. Tripathi-New age Publication
3. Ethics in Management and Indian ethos-BiswanathGhosh-vikas publication
4. Ethics in Management-aryakumar-Anne books Pvt. limited

## MEC 2137 WIRELESS NETWORKS

### Module -1:

#### Wireless Personal Area Networks:

Bluetooth-IEEE 802.15.1: Bluetooth Protocol Stack, Bluetooth Link Type, Bluetooth Security.  
Network Connection establishment in Bluetooth  
ZigBee Technology: ZigBee Components & Network Topologies  
Ultra Wideband-IEEE 802.15.3a

### Module -2:

#### Wireless Local Area Networks:

WLAN Technologies, Protocol architecture, Physical layer, Data link layer, Medium access control layer, Interference between Bluetooth and IEEE 802.11, Security of 802.11 systems

### Module -3:

#### Wireless Wide Area Networks:

GSM Evolution for data, 3G Wireless Systems, cdmaOne Evolution, Evolution of cdmaOne to cdma2000 & Differences between cdma2000 & WCDMA.

### Module -4:

#### TCP over wireless network:

Overview of traditional TCP, Impact on the performance of TCP over wireless environment, Link Layer Scheme (Snoop Protocol), The I-TCP protocol, The mobile TCP protocol.

### Module -5

#### IPv6:

IPv4 vs. IPv6, IPv6 addressing, IPv6 header format, IPv6 extension, IPv6 routing architecture, QoS capabilities, IPv6 transition mechanism

### Module -6:

#### Mobile IP:

Mobile IP: New architecture entities, Operation of Mobile IP, Message Format, Agent Discovery, Agent advertisement, Registration, Authentication, Route optimisation, Mobility support for IPV6

### Module -7:

#### Wireless ATM:

WATM services, Reference model, Functions, Radio access layer, Handover, Location management, Access Point Control Protocol.

### Text Book:

1. Wireless Communication & Networking by Vijay K. Garg, Elsevier

### Reference Books:

1. Mobile communication by J.Schiller, Pearson Education
2. FOROUZAN-----
3. www.ietf.org
  - (i) rfc 3513.txt : IPv6 addressing architecture
  - (ii) rfc 2460.txt : IPv6 specification