

214453 : FOUNDATIONS OF COMMUNICATION AND COMPUTER NETWORK

Teaching Scheme:

Lectures: 4 Hours/Week

Credits

04

Examination Scheme:

In-Semester (Online): 50 Marks

End-Semester: 50 Marks

Prerequisites : Discrete Structures, Engineering Mathematics I and II

Course Objectives :

1. To understand fundamentals of communication systems
2. To acquaint themselves with layered model used computer networks

Course Outcomes :

After successful completion of this course, student will be able to

1. Understand data/signal transmission over communication media
2. Recognize usage of various modulation techniques in communication
3. Analyze various spread spectrum and multiplexing techniques
4. Use concepts of data communication to solve various related problems
5. Understand error correction and detection techniques.
6. Acquaint with transmission media and their standards

Course Contents**UNIT – I INTRODUCTION TO COMMUNICATION AND NETWORKING****9 Hours**

Introduction To Communication Theory: Terminologies, Elements Of Analog Communication System, Baseband signal, Band-pass signal, Need For Modulation, Electromagnetic Spectrum And Typical Applications, Basics Of Signal (Analog And Digital,) Representation And Analysis (Time and frequency)

Introduction To basics of networking: Computer network fundamentals, ISO OSI Model: All Layers, TCP/IP Protocol Suite: All Layers, Addressing (Physical, Logical Port and Other), LAN, WAN And MAN, Network Topologies. Guided Media: Twisted-Pair Cable, Coaxial Cable and Fiber-Optic Cable, Unguided Media: Wireless, Radio Waves, Microwaves And Infrared, Wireless frequency spectrum.

Noise: External Noise, Internal Noise, Noise Calculations, Communication Channel. Discrete and Continuous Channel, Shannon-Hartley Theorem, Channel Capacity, Nyquist and Shanon Theorem, Bandwidth S/N Trade Off

UNIT – II AMPLITUDE AND ANGLE MODULATION**8 Hours**

Amplitude Modulation: Amplitude Modulation Techniques (DSBFC, DSBSC, SSB), Generation Of Amplitude Modulated Signals, Frequency Spectrum.

Angle Modulation Techniques: Theory Of Angle Modulation Techniques, Practical Issues In Frequency Modulation, Generation Of Frequency Modulation, Frequency Spectrum

UNIT – III PULSE AND DIGITAL MODULATION TECHNIQUES**8 Hours**

Pulse Modulation Techniques: Pulse Analog Modulation Techniques, sampling

Pulse Digital Modulation Techniques: PCM, DM, DPCM

Average Information, Entropy, Information Rate. Source coding: Shanon-Fano, Huffman and Limpel-Ziv

Digital-to-digital Conversion: Line Coding, Line Coding Schemes, Block Coding, Scrambling

Digital-to-analog Conversion: Aspects of Digital-to-Analog Conversion, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Quadrature Amplitude Modulation (QAM)

Analog-to-analog Conversion: Amplitude Modulation, Frequency Modulation, Phase Modulation

UNIT – IV ERROR CONTROL CODING AND DATA LINK CONTROL**8 Hours****Error Detection and Correction:** Introduction, Error Detection, Error Correction**Linear Block Codes:** hamming code, Hamming Distance, parity check code**Cyclic Codes:** CRC (Polynomials), Advantages Of Cyclic Codes, Other Cyclic Codes As Examples: CHECKSUM: One's Complement, Internet Checksum**Framing:** fixed-size framing, variable size framing.**Flow control:** flow control protocols.

Noiseless channels: simplest protocol, stop-and-wait protocol.

Noisy channels: stop-and-wait automatic repeat request, go-back-n automatic repeat request, Selective repeat automatic repeat request, piggybacking

UNIT – V MULTIPLEXING AND MULTIPLE ACCESS**6 Hours****Multiplexing:** FDM, TDM, Synchronous Time-Division Multiplexing, Statistical Time-Division Multiplexing, WDM, Spread Spectrum: FHSS and DSSS**Random access:** ALOHA, CSMA, CSMA/CD and CSMA/CA**Controlled Access:** Reservation, Polling and Token Passing**Channelization:** FDMA, TDMA and CDMA**UNIT - VI PHYSICAL, MAC LAYER STANDARDS AND SWITCHING****6 Hours**

LAN hardware: (Switches, routers, hubs, bridges and their types)

IEEE 802.3, Fast Ethernet (MAC Sublayer & Physical Layer), Gigabit Ethernet (MAC Sublayer, Physical Layer) Ten-Gigabit Ethernet, Token ring and token bus standards.

Circuit Switched Networks, Packet (Datagram) Networks, Virtual Circuits, Structure of Circuit and Packet Switches

Text Books

1. George Kennedy, Brendan Davis, srm Prasanna, "Electronic Communication Systems", 5th Edition, ISBN: 9780071077828, MGH Education
2. Behrouz A Forouzan, "Data Communications and Networking", 4th Ed, MGH

Reference Books

1. Simon Haykin and Michael Moher, "Introduction to Analog and Digital Communications" John Wiley & Sons, Inc.
2. Louis E. Frenzel, "Principles Of Electronic Communication Systems (SIE)", 3rd Edition, ISBN: 9780070667556
3. A S Tanenbaum, "Computer Networks", Pearson Education, 4th Edition
4. Roddy & Coolen, "Electronic communications", PHI
5. Kenedy & Davis, " Electronic Communication System", TMH
6. B.P. Lathi, "Modern Digital & Analogue Communication Systems", Ed.-3, Oxford Press.
7. H. Taub And K.L. Shiling, "Principles of Communication System", 3rd Edition, Tata Mcgraw Hill Education Private Limited
8. Irvine, "Data Communications and Networks: An Engineering Approach", Wiley, ISBN-9788126507658.
9. Keshav, "An Engineering Approach to Computer Networking", ISBN-9788131711453, Pearson Education.