

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B.Tech.(CSE), Integrated B.Tech. (CSE)-MBA
Course Code:	2CS202
Course Title:	Data Communications
Course Type:	Core
Year of Introduction:	2023-24

L	T	Practical Component				C
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Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. explain data/signal transmission over communication media (BL-2)
2. analyse various spread spectrum and multiplexing (BL-3)
3. appraise the mechanisms of modulation techniques (BL-4)
4. apply concepts of data communication to solve various problems (BL-3)

Syllabus:

Total Teaching hours: 30

Unit	Syllabus	Teaching hours
Unit-I	Introduction to Data Communication: components of network, its types and topology, protocol. Network models: OSI reference model, TCP/IP protocol suite, Applications of data communications Data Communications and Networking for Today's Enterprise	07
Unit-II	Data and Signal: types of Analog and digital signals and its characteristics, transmission of digital signal, data rate limits, signals in time and frequency domain, transmission impairment, performance measurement of network	05
Unit-III	Digital Transmission: digital to digital and Analog to digital conversion, transmission modes Analog transmission: Digital to analog and analog to analog conversion, and Modulations	06
Unit-IV	Transmission Media: guided media and unguided media: radio frequency allocation, frequency reuse, propagation of radio waves, micro waves and infrared, satellite communication, cellular telephony. Multiplexing and Spread Spreading Techniques: Switching techniques, types of switching, structure of switch, types of switches. Telephone and cable network for data communication, dial up modem, DSL lines, Cable TV.	07
Unit-V	Types of Errors: detection versus correction, coding, block coding, cyclic codes, checksum, forward error correction.	05

Self-Study: The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

- Suggested Readings/References:
1. Behrouz Forouzan, Introduction to Data Communication and Networking, Tata McGraw Hill
 2. William Stallings, Data and Computer Communication, PHI
 3. Schweber W.L, Data Communication, Tata McGraw Hill
 4. Andrew S Tanenbaum, Computer Networks, PHI
 5. B.P. Lathi, Zhi Ding, Modern Digital and Analog Communication, Oxford University Press

Suggested List of Experiments	S. No.	Title	Hours
	1	Understanding the basic computer network terminology and identification of various network-related components: Connectors: RJ32, RS232, BNC, RJ-45, I/O Devices Cables: Coaxial, twisted pair, UTP, NIC (network interface card) Inter-Connecting Devices: Switch, Hub	02
	2	Simulation of different network topologies and comparative study of each. (Using CISCO Packet Tracer).	02
	3	Hands on practice of signals and their properties in MATLAB/Scilab: Amplitude, Phase, Frequency of Pure and Composite signals	02
	4	Implementation and Analysis of Line Coding Schemes: Implement unipolar NRZ-L, NRZ-I and polar Manchester, Differential Manchester and AMI/Pseudo-ternary. Compare the schemes for parameter synchronisation, DC component and bandwidth.	04
	5	Create Peer to Peer network using RS232 & RJ45 cross cable & create switch based networks using RJ45 straight cable. Assign different groups to the different users and allocate different resources to group.	02
	6	Implementation of analog modulation techniques (using MATLAB/Scilab): A. Implement amplitude, frequency and phase modulation. B. Identify the difference between them by comparing the results in terms of bandwidth.	04
	7	Implementation of Pulse Code Modulation: Sampling, Quantisation and Digitisation of various types of waveforms	04
	8	Implementation of Synchronous Time Division Multiplexing technique.	02
	9	Implementation of Cyclic Redundancy Check (CRC) Error Detection Algorithm for Noisy channel.	04
	10	Implementation of Hamming Code.	04

Suggested Case List -NA-

