

COURSE TITLE : **DATA COMMUNICATION**
COURSE CODE : **3067**
COURSE CATEGORY : **B**
PERIODS/WEEK : **4**
PERIODS/SEMESTER : **72**
CREDITS : **4**

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Data Communication, Protocol Architecture and Data Transmission	19
	Test I	1
2	Transmission Media and Signal Encoding	15
	Test II	1
3	Error Detection and Controls, Multiplexing	17
	Test III	1
4	Wireless Telecommunication System	17
	Test IV	1
	Total	72

OBJECTIVES

MODULE 1

- 1.1 Understand the concept of Data Communication.
 - 1.1.1 Explain data communication.
 - 1.1.2 Explain briefly – components of data communication: message, sender, receiver, transmission media and protocol, noise.
 - 1.1.3 Discuss categories of networks: LAN, MAN, WAN.
 - 1.1.4 Explain intranet and INTERNET.
 - 1.1.5 Explain briefly – The topologies: Bus, ring, mesh, star and hybrid.
 - 1.1.6 Define analog and digital signals.
 - 1.1.7 Distinguish between analog and digital data transmission.
- 1.2 Protocol architecture
 - 1.2.1 Discuss Need for a protocol architecture
 - 1.2.2 Discuss design issues of layered architecture.
 - 1.2.3 Explain ISO-OSI layered architecture with block diagram.
 - 1.2.4 Explain TCP/IP protocol architecture.
- 1.3 Data Transmission.
 - 1.3.1 Describe transmission impairments.
 - 1.3.2 Explain attenuation.
 - 1.3.3 Study delay distortion.
 - 1.3.4 Explain various noises: Thermal, inter modulation, cross talk and impulse noise.

MODULE 2

- 2.1 Transmission Media.
 - 2.1.1 Overview of transmission media.
 - 2.1.2 Guided transmission media: Explain briefly the construction characteristics and standards of twisted pair, UTP, co-axial and optical fibre cables.
 - 2.1.3 Wireless transmission: Explain terrestrial, microwave, and satellite communication.
 - 2.1.4 Study of wireless propagation.
 - 2.1.5 Study application of satellites.
 - 2.1.6 Compare guided and unguided transmission media.
- 2.2 Signal Encoding Techniques.
 - 2.2.1 Brief description of signal encoding techniques.
 - 2.2.2 Describe digital data and digital signals.
 - 2.2.2.1 Brief description of digital signal encoding formats: NRZ-L, NRZ-I, Manchester and Differential Manchester.
 - 2.2.3 Study digital data to analog signal encoding.
 - 2.2.3.1 Explain digital modulation techniques such as ASK, FSK and PSK.
 - 2.2.4 Explain analog data to digital signal encoding.
 - 2.2.4.1 Study of PCM and Delta modulation.
 - 2.2.5 Study of analog data to analog signal encoding: Amplitude modulation and Frequency modulation.

MODULE III

- 3.1 Data Communication Techniques.
 - 3.1.1 Describe asynchronous and synchronous transmission.
- 3.2 Type of Errors and Error Detection.
 - 3.2.1 Study of different errors and error detection techniques.
 - 3.2.1.1 Explain parity check and CRC with example.
- 3.3 Explain error correction techniques.
- 3.4 Explain flow controls: Stop and Wait and Sliding Window.
- 3.5 Study error controls – Stop and Wait ARQ, Go back ARQ, Sliding Window ARQ, Selective-Reject ARQ,
- 3.6 Study High Level Data Link Control (HDLC).
- 3.7 Study of Multiplexing.
 - 3.7.1 Discuss need for multiplexing in data communication.
 - 3.7.2 Explain FDM and WDM.
 - 3.7.3 Explain TDM and Synchronous TDM.
- 3.8 Study of RS – 232 C standard.
 - 3.8.1 Study of simplex, half duplex, full duplex communication.

MODULE 4

- 4.1 Wireless Telecommunication Techniques.
 - 4.1.1 Study of Wireless telecommunication techniques.
 - 4.1.1 Explain advantages of wireless communication system.
- 4.2 Study of line-configuration.
 - 4.2.1 Study of point-to-point configuration.

- 4.2.2 Study of multi-point configuration.
- 4.3 Study of switching.
 - 4.3.1 Explain circuit switching.
 - 4.3.2 Explain packet switching.
 - 4.3.3 Explain message switching.
 - 4.3.4 Compare circuit switching and packet switching.
- 4.4 Study of polling techniques.
 - 4.4.1 Study of roll call polling.
 - 4.4.2 Study of hub polling.
- 4.5 Discuss data security.
 - 4.5.1 Overview of Cryptography.
 - 4.5.2 Study of substitution ciphers.
 - 4.5.3 Study of transposition ciphers.
 - 4.5.4 Discuss data encryption standards.
 - 4.5.5 Study of public-key algorithm: RSA
 - 4.5.6 Study of digital signatures.

CONTENT OUTLINE

MODULE 1: BASIC PRINCIPLES

Explanation- basic terminologies-different topologies-LAN & WAN-Analog and digital transmission- protocol architecture –ISO-OST, TCP/IP structures- Various transmission impairments

MODULE 2: TRANSMISSION DATA

Overview-guided transmission media- UTP, coaxial cable, fibre optic cable-wireless transmission- satellite, terrestrial and microwave communication-signal encoding methods-various digital modulation- PCM- Frequency and Analog modulation

MODULE 3: DIFFERENT DATA TRANSMISSION TECHNIQUES

Various errors- error detection and correction –parity-CRC- ARQ- Different types-HDLC- Multiplexing –FDM-TDM-WDM –Static FDM-RS 232C standard-Simplex, HDX and FDX transmission

MODULE 4: WIRELESS COMMUNICATION

Advantages- point to point and multi point configuration-different switching- different polling- data security- ciphers- public key algorithm-RSA-Digital signatures

TEXT BOOK:

1. Data and Computer Communications – William Stallings, Pearson
2. Computer Networks (Fourth Edition) – Andrew S. Tanenbaum, Pearson