Principles of Data Communications

Reference Book: Data Communications and Networking by Behrouz A. Forouzan

PART-I INTRODUCTION

1. **Introduction to Networks**

Topology	
Types of Networks	
Switching	Circuit Switching Packet Switching
Network Models	TCP/IP OSI

2. **Introduction to Physical Layer**

Data and Signals	Analog & Digital Data Analog & Digital Signals Periodic & Non-Periodic Signals *Discrete & Continuous Signals*	
Periodic Analog Signals	Sine Wave	Peak Amplitude Period & Frequency Phase
	Wavelength	
	Composite Signals	
	Bandwidth	
Digital Signals	Bit Rate	
	Bit Length	
	Digital Signal as a composite analog signal	
	Transmission of Digital Signals	Baseband Broadband
Transmission Impairment	Attenuation : Decibel Distortion Noise : SNR, SNR_{db}	
Data Rate Limits	Noiseless Channel	Nyquist bit rate
	Noisy Channel	Shannon Capacity
Performance	Bandwidth Throughput Latency (delay) Bandwidth-Delay Product Jitter	
Fourier Analysis		
Energy & Power Signals		
Mathematical Review		

PART-II PHYSICAL LAYER (continued...)

3. **Digital Transmission (Conversion to Digital Signals for Transmission)**

Digital to Digital Conversion (Digital Data to Digital Signal)	Line Coding	Unipolar Scheme -NRZ Polar Schemes -NRZ, RZ, biphase(Manchester, Differential Manchester) Bipolar Schemes -AMI & Pseudoternary Multilevel -2B1Q,8B6T Multitransition -MLT3
	Block Coding	4B/5B
	Scrambling	Bipolar with 8-zero substitution (B8ZS) HDB3 (High Density Bipolar 3-zero)
Analog to Digital Conversion (Analog Signal to Digital Signal)	Pulse Code Modulation (PCM)	Sampling Sampling Rate (Nyquist Theorem) Quantization
	Delta Modulation (DM)	

4. **Analog Transmission (Conversion to Analog Signal for Transmission)**

Digital to Analog Conversion (Digital Data to Analog Signal)	Amplitude Shift Keying (ASK) Frequency Shift Keying (FSK) Phase Shift Keying (PSK)
Analog to Analog Conversion (Analog Signal to a new Analog Signal)	Amplitude Modulation (AM) Frequency Modulation (FM) Phase Modulation (PM)

PART-II PHYSICAL LAYER (continued...)

5. **Multiplexing**

Frequency Division Multiplexing (FDM)
Time Division Multiplexing (TDM)
Wavelength Division Multiplexing (WDM)

6. **Transmission Media**

Guided Media	Twisted-Pair Cable Coaxial Cable Fiber-Optic Cable
Unguided Media (Wireless)	Radio Waves Microwaves Infrared