**Note that the topics listed below are for reference only and may not be comprehensively listed.**

**Chapter 1 Introduction**

Data Communications System: Sender, Receiver, Transmission Medium, Message, Protocol
Data Flow: Simplex, Half-duplex, Full-duplex
Types of Connection: Point-to-point, Multipoint
Physical Topologies: Mesh, Star, Bus, Ring

**Chapter 2 Network Models**

Layered Architecture: OSI vs. TCP/IP
TCP/IP Protocol Suite: Physical, Data link, Network, Transport, Application
Physical vs. Logical Connection
Encapsulation and Decapsulation
Addressing

**Chapter 3 Introduction to Physical Layer**

Data and Signal: Analog vs. Digital
Periodic vs. Nonperiodic
Period and Frequency
Trigonometry
Analog: Simple and Composite
    Sine wave: Amplitude, Frequency and Phase
    Wavelength
Digital: Bit rate, Bit length
Bandwidth
Baseband vs. bandpass
Time-domain vs. Frequency-domain (Periodic: spikes; Nonperiodic: continuous)
Transmission Impairments: Attenuation, Distortion and Noise
Logarithm
Decibel, Signal-to-Noise Ratio
Data rate limits: Nyquist (Noiseless Channel), Shannon (Noisy Channel)
Performance: Bandwidth, Throughput, Latency (Delay), Jitter **==> Assignment #1**

**Chapter 4 Digital Transmission**

Data vs. Signal
Digital-to-digital:
Line coding: Unipolar - NRZ, Polar: NRZ-L, NRZ-I, Bipolar: AMI and Pseudoternary
Synchronization: Polar Biphase: RZ, Manchester, Differential Manchester
Analog-to-digital: PCM (Sampling, Quantizing, Encoding)
Transmission Modes: Parallel, Serial (Asynchronous, Synchronous, Isochronous)

**Chapter 5 Analog Transmission**

Bit rate, baud rate and carrier frequency
Digital-to-analog (ASK, FSK, PSK, QAM)
Constellation Diagrams
Analog-to-Analog (AM, FM, PM)

**Chapter 6 Multiplexing**

FDM
WDM
TDM: Synchronous: Interleaving, Framing bits
Disparate Input Data Rates: Multilevel Multiplexing, Multiple-Slot Allocation, Pulse Stuffing
Statistical: Addressing **==> Assignment #2**

**Chapter 7 Transmission Media**

Guided: Twisted pair, coaxial cable, fiber optic
Unguided: Radio wave, microwave, infrared **==> MT**

"Good Luck!"