Chapter 1

- How does directly connected networks (i.e. nodes are directly connected to each other via some physical medium or nodes are directly connected to a physically shared medium) affect scalability?
    - How do we improve scalabilty?
- **Switched Networks**
    - Compare and contrast circuit switched networks and packet switched networks.
    - What limitation of circuit switched networks does packet switched networks address? How does it address this limitation?
- **Resource Sharing**
    - Define Multiplexing
    - Synchronous time-division multiplexing
    - Frequency division multiplexing
    - Explain limitations of STDM and FDM
    - Statistical multiplexing
- **Performance**
    - Bandwidth – also called throughput - # of bits that can be transmitted over the network in a certain period of time
    - Latency – also called delay; the amount of time that it takes a message to travel from one end of a network to the other; measured in terms of time
        - Latency = Propagation + Transmit + Queue
        - Propagation = Distance/Speed of Light
        - Transmit = Size/Bandwidth
    - Bandwidth Delay Product = number of bits that will fit in a pipe at a certain instant; denotes the number of bits that the sender must transmit before the first bit arrives at the receiver
    - RTT (Round Trip Time) – Most of the time we are interested in the RTT because a sender waits on the receiver to send a signal, indicating that it has received data.
    - Throughput = Transfer_Size/ TransferTime
    - TransferTime = RTT + (TransferSize/Bandwidth)
        - RTT is added because to account for the request message in a client server model
    - How Big is Mega
        - Bandwidth – Mbps 10 ^6
        - Memory – stored in bytes, MB is 2^20
- Traffic Intensity
- **Example Questions: R22-R25, P6**

Chapter 2 Applications

- Understand application layer protocols and services.
- Persistent vs non persistent TCP connections
- Web Caches and Proxies.

- FTP vs HTTP
- DNS and the services that it provide
  - Name resolution, host aliasing, load distribution, etc

Chapter 3 Transport Layer Protocols

Go through again.

- UDP and the services it provides
- TCP and the services that it provides
  - Reliability, flow control, timeout estimation, congestion control
  - Silly Window Syndrome and Nagel's algorithm
- **Question:** A TCP connection is established between a sender and receiver. The receiver's window is 100KB and the maximum segment size is 1KB.
  The congestion control window (cwnd) is 32 KB when a timeout occurs. List the different cwnd sizes prior to and including the time that the timeout occurs.
- Questions: R14, P3,P29, P31

Chapter 4

https://dncsite.wordpress.com/2012/11/05/163/

- IPv 4
- IPv6
- SDN
- NAT
- DHCP
- ~~NAT~~
- What's inside a router? (Section 4.3)
  - Switching fabric
  - Head of Line Blocking
  - Queueing
    - FIFO
    - Random Early Drop (RED)

Chapter 5

- Intra-Domain Routing
  - Link State
  - Distance Vector
- Inter_Domain Routing (BGP)
  - BGP Security
- SDN
- ICMP
- SNMP
- Questions: R4, R5, R11, P4.a, P14

Chapter 6

- Error detection and correction: parity, checksum, CRC
- Multiple/link access protocols
  - Channel partitioning protocols, random access protocols, taking-turn protocols
  - Aloha, Slotted Aloha, Token Ring
- Link layer addressing
- ARP
- Ethernet
- Switching, VLANs
- Questions: (Chapter 6: P1, P5, P17)

Chapter 7

- Wi-Fi
  - Code Division Multiplexing
- Questions:(Chapter 7: P1, P6)