

**Disclaimers:**

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

**(2) The final examination is comprehensive and will include topics from before the midterm (~30%) and after the midterm (~70%).**

**Chapter 8                      Switching**

Circuit-switching

Packet-switching: datagram, virtual-circuit

**Chapter 9                      Introduction to Data-Link Layer**

Nodes, Links

Services: Framing, Error Control, Flow Control, Congestion Control (Network/Transport)

Sublayers: Data link control sublayer (DLC), Media access control sublayer (MAC)

MAC addresses

Unicast, multicast, broadcast

Address resolution protocol (ARP)

**Chapter 10                    Error Detection and Correction**

Single-bit error, burst error, redundancy

Error detection (Hamming distance, minimum hamming distance) vs. error correction

Coding (block code, linear block code, parity-check code, cyclic code), code rate

Cyclic redundancy check (CRC), Checksum

**Chapter 11                    Data Link Control**

Framing: character-oriented framing, bit-oriented framing

Flow Control, Error Control

Connection: connectionless, connection-oriented

Finite state machines (FSM)

Stop-and-Wait Protocol

Piggybacking

**Chapter 12                    Media Access Control**

Random Access: pure ALOHA, slotted ALOHA, CSMA, CSMA/CD, CSMA/CA (NAV)

Throughput, vulnerable time

**=> Assignment #3**

## **Chapter 18                      Introduction to Network Layer**

Services: Packetizing, Routing, Forwarding

IPv4: Address space and notation (prefix, suffix), Classful addressing, Classless addressing (CIDR)

Forwarding tables

Subnetting, Supernetting

Network-layer performance: Delay, Throughput, Packet Loss

Congestion Control: Backpressure, Choke packet

## **Chapter 19                      Network Layer Protocols**

IPv4: datagram header format, header checksum

Device-to-device communication (IP), connectionless, unreliable communication

Fragmentation

ICMPv4, ICMP checksum

## **Chapter 20                      Unicast Routing**

Graph theory: Least cost trees

Routing algorithms: distance-vector routing (Bellman-Ford), link-state routing (LSDB, Dijkstra's)

## **Chapters 23/24                      Transport Layer/Transport Layer Protocols**

Process-to-process communication (Port)

Services: Flow control, error control, congestion control

UDP: connectionless, unreliable

TCP: connection-oriented, reliable

    TCP segment header format

    Sequence number, acknowledgement number

    Connection establishment, data transfer, connection termination (half-close)

    Time-line diagrams

    Send window, receive window: flow control, error control, congestion control

    State transition diagram

**=> Assignment #4, Final**

*"That's all Folks!"*

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*"Good Luck!"*