Midterm Review

I. Seven Layer ISO OSI Reference Model
  A. Network architecture, protocols
  B. OSI stack versus TCP/IP suite
     1. Layer interfaces
     2. encapsulation
II. Introduction
  A. Definitions
     1. performance measures
       a. throughput
       b. utilization
       c. response time
       d. end-to-end delay
          i.   processing delay
          ii. queueing delay
          iii. transmission delay
          iv. propagation delay
       e. latency
       f. goodput
       g. fairness
       h. store-and-forward networks
       i.   cut-through routing
III. Data Link Layer
  A. Tanenbaum's DL protocols
     1. Utopia
     2. Stop-and-Wait   {introduce ACKs}
     3. PAR   {noisy channel}
       a. old version
         1. ACK, timer, duplicate frames
       b. "new version"   {ACKs, timers, premature timeouts}
     4. Sliding Window Protocols
       a. piggybacking ACKs
       b. 1-bit sliding window (protocol 4)
       c. Go Back N (protocol 5)
       d. Selective Repeat (protocol 6)
       e. NAKs, ACKtimer
  A. Synchronous vs asynchronous transmissions
     1. bit, character, block level
  B. Framing
     1. bit stuffing
     2. byte stuffing
     3. HDLC
     4. PPP

   C. Transmission Errors
      1. error detection and error correction
      2. Hamming distance
      3. CRC
         a. polynomial code
         b. generating function $G(x)$
         c. CRC algorithm

IV. Miscellaneous topics before physical layer
   A. Multiplexing   *{Note – multiplexing was covered just before*
      1. TDM   *PCM in the Physical Layer section}*
      2. FDM
      3. statistical multiplexing {concentrator}
      4. WDM

V. Physical Layer
   A. Definitions
      1. baud {modulation rate}
      2. data rate {capacity}
      3. bandwidth
      4. voice-grade line
   B. Nyquist Theorem
      1. signal constellations
   C. Shannon's Result
      1. signal-to-noise ratio
      2. decibel definition
   D. Analog vs Digital
      1. data
      2. signals
      3. transmissions
      4. attenuation
      5. amplifiers vs repeaters
      6. modems
      7. codec
      8. advantages vs disadvantages
   E. Data Encoding Techniques
      1. digital data, analog signals
         a. Amplititude modulation
         b. Frequency modualtion
         c. Phase modulation
      2. digital data, digital signals
         a. NRZL
         b. NRZI
            i. differential codes
         c. Bi-phase codes
            i. Manchester
            ii. differential Manchester
      3. analog data, digital signals

    a. PCM
    b. T1 carrier
    c. delta modulation
F. Transmission Media
    1. twisted pair
        a. UTP Cat 3,4, 5,5e,6
        b. Dial up connections
        c. ADSL
        d. Hub topology
    2. Coaxial cable
        a. baseband
            i. 10BASE2
            ii. 10BASE5
        b. broadband   {CATV}
            i. HFC
    3. Optical Fiber
        a. three types of fiber
        b. three different wavelengths
        c. FiOS
---------------------only up to here for Mid Term!!---------------------------