Digital Communication and Computer Networks

Theory: CS 3202
Laboratory: CS 3272

Dr. Nirnay Ghosh

Class Schedule

- 4 credits for theory
- 2 credits for laboratory

- Theory Class Timings:
  - MON (1530 hrs. – 1720 hrs.)
  - FRI (1100 hrs. – 1250 hrs.)

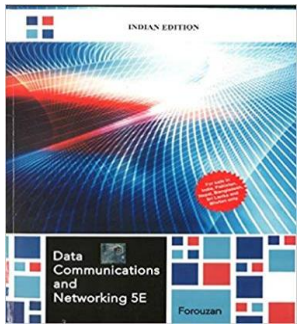
- Laboratory Class Timing:
  - TUE (1430 hrs. – 1720 hrs.) - Gx
  - FRI (1430 hrs. – 1720 hrs.) - Gy

- Class room teaching - comprise of both board work and slides

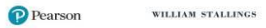
- Follow course updates on my Google Classroom.

Text/Reference Books

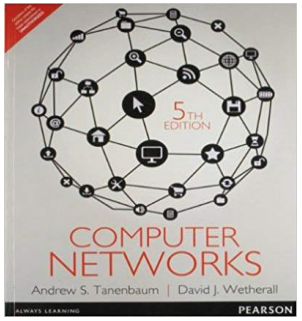
- Behrouz A. Forouzan. “Data Communications and Networking”, 5th Edition, *McGraw Hill Publishing Co.*



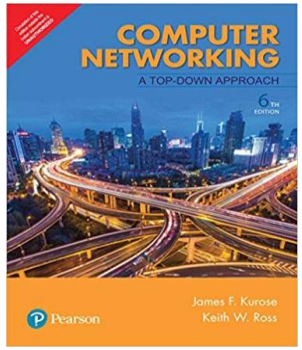
- William Stallings. “Data and Computer Communications”, 10th edition*, Pearson Larry Publication.*



- Andrew S. Tanenbaum and David J. Wetherall. “Computer Networks”, 5th Edition*, Pearson Larry Publication.*



- James Kurose and Keith Ross, "Computer Networking: A Top-Down Approach" 6th edition, *Pearson Larry Publication*.



Grading

- Theory:
  - Class test/Quiz/Viva: 20%
  - Mid-semester exam: 30%
  - End-semester exam: 50%
- Laboratory:
  - Assignments: 70%
  - Viva-voce: 30%

Topics to be Covered in Theory

- **Module 1:**
  - Data communication Components: Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, TCP/IP Protocol Suite, OSI model.

- **Module 2**:
  - Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Firewalls, Basic concepts of Cryptography.

- **Module 3:**
  - Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

Topics to be Covered (Tentative)

- **Module 4:**
  - Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

- **Module 5:**
  - Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction -Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD,CDMA/CA, Wired LAN, Wireless LANs, Connecting LANs and Virtual LANs

- **Module 6**:
  - Physical layer: Data & Signals, Periodic Analog Signals, Digital Signals, Transmission Impairments, Data Rate Limits, Performance; Techniques for Bandwidth utilization: Multiplexing - Frequency Division, Time Division and Wave Division, Concepts on Spread Spectrum; Switching – Circuit Switching, Packet Switching

Topics (Tentative) to be Covered in Laboratory

- Understand the use of various command line tools like ping, arp, route, ifconfig, host, traceroute, dig etc.

- Understand the basics of socket programming using C/Java/Python and carry out a variety of programming assignments using the skeleton code.

- Use packet sniffing tools like tcpdump/Wireshark to understand various concepts: encapsulation/decapsulation; multiplexing/demultiplexing, DHCP operation, IP fragmentation, ARP operation, ICMP operation, TCP operation, application protocols such as HTTP, FTP, SMTP.