B.E. INFORMATION TECHNOLOGY
FOURTH YEAR SEMESTER VII

SUBJECT: ADVANCED COMPUTER NETWORKS
(ELECTIVE-I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term Work: 25 Marks** **Oral: 25 Marks**

Objectives: In first part, advanced technologies like High speed Devices etc. are to be considered. Second part Network programming is to be studied. Not just SOCKETS but also protocols, Drivers, Simulation Programming. In third part we should study Network Design, Protocols designs and analysis considering deterministic and non-deterministic approach. We expect natural thinking from student. For example he should able to consider different constraints and assume suitable data and solve the problems.

Pre-requisites: Computer networks

DETAILED SYLLABUS

Data Communications: Business Drivers and Networking Directions: Data communication Past and future.

Understanding the standards and their maker: Creating standards: players and Process, Current forums, Standard protocols, Layered reference models: The OSIRM, Standard computer architectures.

Introduction to Transmission Technologies: Hardware selection, in the design process.

Optical Networking: SONET/SDH standards, Dense wavelength division multiplexing (DWDM), Performance and Design considerations.

Physical Layer Protocols and Access Technologies: Physical Layer Protocols and

Interfaces, Accessing the Network, Copper access technologies, Cable Access Technologies, Fiber Access Technologies, Air Access Technologies.

Common Protocols and Interfaces in the LAN environment: Data link layers protocols, LLC and MAC sub layer protocol, Ethernet, Token Ring, Token Bus and FDDI, Bridge protocols, Switching in the LAN environment

Frame Relay: FR specification and design, VoFR: Performance and Design considerations, Advantages and disadvantages of FR.

Common WAN Protocol: ATM: Many faces of ATM, ATM protocol operation (ATM cell and Transmission), ATM networking basics, Theory of operation ISDN protocol reference model, PHY layer, A TM layer (Protocol model), AMT layer and cell (Definition), Traffic descriptors and parameters, Traffic and Congestion control defined, AAL Protocol model, Traffic contract and QoS, User plane overview, Control plane AAL, Management plane, Sub-DS3 ATM, ATM public services.

Common Protocols and Interfaces in the Upper Layers (TCP/IP): Background (Routing protocols), TCP/IP suite, Network layer (Internet work layer), Transport layer, Application layer, Addressing and routing design.

Mature Packet Switched Protocol: ITU Recommendation X.25, User connectivity, Theory of Operation, Network layer functions, X.75 Internetworking protocol, switched multimegabit data service (SMDS), SMDS and IEEE 802.6, Subscriber Interface and Access protocol, Addressing and Traffic control.

Requirements Definition: User requirements, Traffic sizing, Traffic characteristics, Protocols, Time and Delay considerations, Connectivity, Availability, Reliability and Maintainability, Service aspects, Budget constraints.

Traffic Engineering and Capacity planning: Background (Throughput calculations), Traffic engineering basics (Traffic characteristics), Traditional Traffic engineering, Queued data and packet switched traffic modeling, Designing for peaks, Delay or Latency, Availability and reliability, Network performance modeling, Creating the traffic matrix, Capacity planning and Network vision, Design tool, Categories of tools, Classes of design tool, Components of design projects, Types of design projects.

Technology Comparisons: Circuits-message-packet and cell switching methods, Packet switching service aspects, Generic packet switching network characteristics, Private verses public networking, Public network service selection, Business aspects of Packet-Frame and cell switching services, High speed LAN protocols comparisons, Application performance needs.

Access Network Design: Network design layers, Access layer design, Access network

capacity, network topology and hardware, completing the access network design.

Backbone Network Design: Backbone requirements, Network capacities, Topologies, Topologies strategies, Tuning the network.

BOOKS

TEXT BOOKS

- Darren L Spohn, "Data Network Design", TMH
- D. Bertsekas, R. Gallager, "Data Networks', PHI

REFERENCES

- W.R. Stevens, "Unix Network Programming", Vol. 1 , Pearson Education
- J. Walrand, P. Varaiya, "High Performance Communication Networks", Morgan Kaufmann
- Y. Zheng, S. Akhtar, "Networks for Computer Scientists and Engineers", Oxford
- A.S. Tanenbaum, "Computer Networks"
- Peterson & Davie, "Computer Networks", Harcourt Asia.
- James D. McCabe, "Practical Computer Analysis and Design", Harcourt Asia.

TERM WORK

Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.