RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

CSE-Data Science/Data Science, VI semester

CD 602- Computer Networks

Course Outcomes: After completion of the course students will be able to

1. Characterize and appreciate computer networks from the viewpoint of components andfrom the viewpoint of services
2. Display good understanding of the flow of a protocol in general and a network protocolin particular
3. Model a problem or situation in terms of layering concept and map it to the TCI/IP stack
4. Select the most suitable Application Layer protocol (such as HTTP, FTP, SMTP, DNS,Bit torrent) as per the requirements of the network application and work with availabletools to demonstrate the working of these protocols.
5. Design a Reliable Data Transfer Protocol and incrementally develop solutions for therequirements of Transport Layer
6. Describe the essential principles of Network Layers and use IP addressing to createsubnets for any specific requirements

Unit –I

Computer Network: Definitions, goals, components, Architecture, Classifications & Types.Layered Architecture: Protocol hierarchy, Design Issues, Interfaces and Services, ConnectionOriented & Connectionless Services, Service primitives, Design issues & its functionality. ISOOSI Reference Model: Principle, Model, Descriptions of various layers and its comparison withTCP/IP. Principals of physical layer: Media, Bandwidth, Data rate and Modulations

Unit-II

Data Link Layer: Need, Services Provided, Framing, Flow Control, Error control. Data LinkLayer Protocol: Elementary &Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat,Hybrid ARQ. Protocol verification: Finite State Machine Models & Petri net models.ARP/RARP/GARP

Unit-III

MAC Sub layer: MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, DistributedRandom Access Schemes/Contention Schemes: for Data Services (ALOHA and SlottedALOHA), for Local-Area Networks (CSMA, CSMA/CD, CSMA/CA), Collision Free Protocols:Basic Bit Map, BRAP, Binary Count Down, MLMA Limited Contention Protocols: AdaptiveTree Walk, Performance Measuring Metrics. IEEE Standards 802 series & their variant.

Unit-IV

Network Layer: Need, Services Provided, Design issues, Routing algorithms: Least CostRouting algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing,Broadcast Routing, Multicast Routing. IP Addresses, Header format, Packet forwarding,Fragmentation, and reassembly, ICMP, Comparative study of IPv4 & IPv6

Unit-V

Transport Layer: Design Issues, UDP: Header Format, Per-Segment Checksum, CarryingUnicast/Multicast Real-Time Traffic, TCP: Connection Management, Reliability of DataTransfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP TimerManagement.Application Layer: WWW and HTTP, FTP, SSH, Email (SMTP, MIME, IMAP),DNS, Network Management (SNMP).

References:

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks" Pearson Education.
2. Douglas E Comer, "Internetworking WithTcp/Ip Principles, Protocols, And Architecture - Volume I"6th Edition,Pearson Education
3. DimitriBertsekas, Robert Gallager, "Data Networks", PHI Publication, Second Edition.
4. KavehPahlavan, Prashant Krishnamurthy, "Networking Fundamentals", WileyPublication.
5. Uyless Black, "Computer Networks", PHI Publication, Second Edition.
6. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open SourceApproach", McGraw Hill.

List of Experiments:

1. Study of Different Type of LAN& Network Equipments.
2. Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc.
3. LAN installations and Configurations.
4. Write a program to implement various types of error correcting techniques.
5. Write a program to Implement various types of framing methods.
6. Study of Tool Command Language (TCL).
7. Study and Installation of Standard Network Simulator: N.S-2, N.S3.OpNet,QualNetetc .
8. Study & Installation of ONE (Opportunistic Network Environment) Simulator for HighMobility Networks .
9. Configure 802.11 WLAN.
10. Implement &Simulate various types of routing algorithm.
11. Study & Simulation of MAC Protocols like Aloha, CSMA, CSMA/CD and CSMA/CA usingStandard Network Simulators.
12. Study of Application layer protocols-DNS, HTTP, HTTPS, FTP and TelNet.