Kadi Sarva Vishwavidyalaya, Gandhinagar
MCA Semester I
MCA-14:Advanced Networking

Rationale:
- To give the understanding of the functionality of each layer of TCP/IP model and interactions between them.
- To give the understanding of the functionality of UDP and TCP Protocols.
- To describe the working of routing algorithms and its techniques.
- To Enhance the knowledge of networking in wireless scope and its security as well

Prerequisite: Basic concepts of network communication such as ports, topologies, Categories of Networks, Physical Media, Switch, Router, Hub, Bridges, Gateway, Repeater etc.

Learning Outcomes:
At the end of the course, student will be able to:
- Create a small network - wired as well as wireless
- Understand the IPv4 and IPv6 addresses
- Understand the essentials and working of protocols like DHCP, DNS, FTP, TFTP etc.
- Develop network specific programs

Teaching and Evaluation Scheme: The objective of evaluation is to evaluate the students throughout the semester for better performance. Students are evaluated on the basis of continuous evaluation system both in theory and practical classes based on various parameters like term work, class participation, practical and theory assignments, presentation, class test, Regular Attendance, etc.

Sub Total Credit	Teaching scheme (per week)		Examination scheme				Total Marks
			MID	CEC	External		
	Th	Pr	Th	Th	Th.	Pr.	
4	3	2	25	25	50	50	150

Course content:

Unit 1: Basics of Networking [15%]

Categories of Networks: Local Area Network, Wide Area Network, Metropolitan Area Networks, OSI Reference Model, TCP/IP Model

Unit 2: Internet Protocols & ICMP [25%]

IP Addressing: IP4 and IP6, IP Address, Class full Addressing, Connectionless Datagram Delivery, Forwarding IP Datagram, Routing table,
ICMP: ICMP protocol, ICMP Message format

Unit 3: CIDR, UDP and TCP [20%]

   CIDR: Subnet Addressing, Subnet mask representation, Classless Addressing
   UDP and TCP: UDP Message Format, UDP Pseudo Header, Ports, End Points, Passive and
   Active opens, Segments, TCP Options, Karn's Algorithm, Congestion, TCP State machine, Silly
   window syndrome

Unit 4: VPN, DNS and TCP protocols [25%]

   Virtual Private Network (VPN), Domain Name System (DNS), Name to IP Address Mapping and vice-
   versa, World Wide Web(WWW) Service, BOOTP, Dynamic Host Configuration Protocol(DHCP), Lease
   Mechanism, Planning, DHCP Environment, DHCP State machine, TELNET, FTP Services, TFTP, Simple
   Mail Transfer Protocol (SMTP), POP3, Internet Message Access Protocol (IMAP), Multipurpose
   Internet Mail Extensions (MIME), Mobile IP

Unit 5: Internet security [15%]

   Introduction to IPsec and SSL, Need for Security, IPSec, Authentication Header (AH), Security
   Association (SA), Encapsulating Security Payload (ESP), Authentication and mutable header   fields,
   Tunneling, Required security algorithms, Secure Sockets (SSL and TLS), Firewalls, Firewall
   implementation issues, Monitoring and logging

Text Book(s):
1. Internetworking with TCP/IP Vol.1: Principles, Protocols, and Architecture (5th Edition) by
     Douglas E. Comer, Prentice Hall
2. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, Fourth
     Edition

Other Reference Books:
1. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.
2. TCP/IP Protocol Suite forth Edition, TMH, Behrouz A. Forouzan
3. TCP/IP Illustrated volume -1 Second Edition The Protocols by kevin R. Fall and W Richard
     Stevens. Pearson Pub.
4. CCIE Professional development, Routing TCP/IP Vol. 1 second edition Cisco publication Jeff doyle,
     jenifer Carroll.

Unit wise coverage from text book(s):
   UNIT 1: Book 2 and Reference Book 1
   UNIT2: Ch. 4, 6, 7, 8
   UNIT3: Ch. 9, 11, 12
   UNIT4: Ch. 18, 19, 22 - 27
   UNIT5: Ch. 30

Practical List:
   1.   Write a program to implement TCP Socket, with two-way communication only once. (Non-GUI).
   2.   A program to implement simple UDP Client and Server.
   3.   Write a client / server socket program in which the server echoes the message sent by the client.
        (Non-GUI).
   4.   Server returns the current date and time to the client. (Non-GUI).
   5.   A java program in which server computes the factorial of the number, given by the client. (Non-
        GUI). (Can be extended to all the logics of earlier programming languages like C and C++).
   6.   A program to implement the concept of chatting between the two clients.
   7.   A program to implement the Inet-Address. Give the IP-Address in command line.

8. A Non-GUI program to send different "Quote of the Day" to every client when connected.
9. A program running server socket to validate the user and password information given by the client at command line.
10. A java routine to implement the concept of Broadcasting.
11. A java routine to implement the concept of Multicasting.
12. A java routine to implement the concept of Single Client connects to one server available from multiple servers using multi-threading.
13. A Non-GUI based program to implement the FTP (File Transfer Protocol). Filename given by command-line, should be transferred to the Server's machine.
14. A Non-GUI program to implement TELNET. You first login then give the commands which you have decided. According to the commands, desired output should be available on the client's screen. Implement Dir, Date, Time, Hello, Exit commands.
15. Non-GUI program to implement ARP (Address Resolution Protocol) (means ping facility). Give IP address from client side and check the existence of the server at given IP address. If server exists, then give positive reply otherwise after some time; raise error of time out (Four times).
16. A GUI-based program to implement DNS (Domain Name Services). Server keeps track on all available clients and their addresses (Name with IP: port). When Client gives a request for other client using name, Server checks the existence of the same and if available, connects both the clients or just replies with intended client's IP address and Port.
17. A program to implement HTTP server's GET method.

Note: Perform all the above practical using Java Socket Programming without use of IDEs