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				
			MID	CEC	External		Total Marks
	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:

Write a program to implement the Inet-Address. Give the IP-Address in command line.

TCP Implementation

1. Write a client server program using TCP in which client sends a string to the server and server replies the reverse of the string.
2. Write a client server program using TCP in which client sends an integer number to the server and server replies the factorial of it.
3. Write a client server program using TCP in which client sends an integer number to the server and server replies the Fibonacci series till that number.
4. Write a client server program using TCP in which client sends two integer numbers 'x' and 'n' to the server and server replies x raise to n.
5. Write a client server program using TCP in which client requests date from the server and server sends the date.
6. Write a client server program using TCP in which client sends a string to the server and server replies the strings are palindrome or not.
7. Write a client server program using TCP in which client sends an integer number to the server and server replies whether it is even number or odd number.
8. Write a client server program using TCP in which client sends an integer number to the server and server replies whether it is prime number or not.
9. Write a client server program using TCP in which client chats with the server. It should be a two-way chat.

UDP Implementation

10. Write a client server program using UDP in which client sends a string to the server and server replies the reverse of the string.
11. Write a client server program using UDP in which client sends an integer number to the server and server replies the factorial of it.
12. Write a client server program using UDP in which client sends an integer number to the server and server replies the Fibonacci series till that number.
13. Write a client server program using UDP in which client sends two integer numbers 'x' and 'n' to the server and server replies x raise to n.
14. Write a client server program using UDP in which client requests date from the server and server sends the date.
15. Write a client server program using UDP in which client sends a string to the server and server replies the strings are palindrome or not.
16. Write a client server program using UDP in which client sends an integer number to the server and server replies whether it is even number or odd number.
17. Write a client server program using UDP in which client sends an integer number to the server and server replies whether it is prime number or not.
18. Write a client server program using UDP in which client chats with the server. It should be a two-way chat.

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