# NETWORK PROGRAMMING AND MANAGEMENT

**V Semester: CSE(CS)**

| Course Code | Category | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIA | SEE | Total |
| ACCC05 | Elective | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| Contact Classes: 45 | Tutorial Classes: Nil | Practical Classes: Nil | | | | Total Classes: 45 | | |

**Prerequisite: Computer Networks**

## I.COURSE OVERVIEW:

This course will cover the practical aspects of computer network programming, with emphasis on the Internet. The goal of this course is to introduce the basics of computer networks and Internet programmingand the TCP/IP protocol stack and some of its important protocols.

## II. COURSE OBJECTIVES:

The students will try to learn:

I. The basic concepts of connection oriented communication over network.
II. The concepts of multiplexing in client server environment.
III. The functions and protocols needed for connection less communication over networks.
IV. The management concepts and practical issues of simple network management protocols.

## III. COURSE OUTCOMES:

**After successful completion of the course, students should be able to:**

| | | |
|---|---|---|
| CO 1 | **Interpret** TCP Socket functions between client and server to listento the TCP port for incoming connections | Understand |
| CO 2 | **Make use of** different boundary conditions in the server and I/O multiplexing to establish the connection in the network | Apply |
| CO 3 | **Match** each of the socket options for each of the layer in the TCP/IPstack to improve the performance of wired network connections | Remember |
| CO 4 | **Recall** the UDP socket functions to maintain low – latency and loss – tolerance connections between applications on the internet | Remember |
| CO 5 | **Demonstrate** the working of different communication protocols that helps to create secure socket applications. | Understand |
| CO 6 | **Illustrate** various network management protocols for monitoring andcontrol of networks on Local Area Network or Wide Area Network. | Understand |

## IV. COURSE SYLLABUS:

**MODULE-I: ELEMENTARY TCP SOCKETS (09)**

Introduction to socket programming, overview of TCP/IP protocols, introduction to Sockets, socket address structures, byte ordering functions, address conversion functions, elementary TCP sockets, socket, connect, bind, listen, accept, read, write, close functions, iterative server, concurrent server.

**MODULE-II: APPLICATION DEVELOPMENT (09)**

TCP echo server, TCP echo client, posixsignal handling, server with multiple clients; Boundary conditions: Server process crashes, server host crashes, server crashes and reboots, server shutdown, I/O multiplexing, I/O Models, select function, shutdown function, TCP echo server (with multiplexing), poll function, TCP echo client (with multiplexing).

**MODULE-III: SOCKET OPTIONS, ELEMENTARY UDP SOCKETS (09)**

Socket options, getsocket and setsocket functions, generic socket options, IP socket options, ICMP socket options, TCP socket options, elementary UDP sockets, UDP echo server, and UDP echo client.

Multiplexing TCP and UDP sockets, domain name system, and gethostbyname function, Ipv6 support in DNS, gethostbyadr function, getservbyname and getserv by port functions.

**MODULE-IV: ADVANCED SOCKETS (09)**

Ipv4 and Ipv6 interoperability, threaded servers, thread creation and termination, TCP echo server using threads, mutexes, condition variables, raw sockets, raw socket creation, raw socket input, raw socket output, ping program, trace route program.

**MODULE-V: SIMPLE NETWORK MANAGEMENT (09)**

SNMP network management concepts, SNMP management information, standard MIB's, SNMPv1 protocol and practical issues, introduction to RMON, SNMPv2 andSNMPv3.

## V. TEXT BOOKS:


1. W. Richard Stevens, "UNIX Network Programming Vol-I", Pearson Education, 3rd Edition, 2008.
2. Mani Subramanian, "Network Management: Principles and Practice", Addison Wesley, 1st Edition, 2001.


## VI. REFERENCE BOOKS:


1. D.E. Comer, "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), Pearson Education, 2nd Edition, 2003.
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Addison Wesley, 3rd Edition, 1999.


## VII. WEB REFERENCES:

1. https://notes.shichao.io/unp/ch4/
2. https://books.google.co.in/books?isbn=8184317565
3. https://docs.oracle.com/cd/E19683-01/817-0573/transition-tbl-16/index.html
4. https://docs.oracle.com/cd/E26502_01/html/E35299/sockets-22932.html