

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**Integrated-MCA**  
**Year V – (Semester-IX) (W.E.F. June 2017)**

**Subject Name: Advanced Networking (AN)**  
**Subject Code: 4490609**

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**1. Learning Objectives:**

- Develop strong analysis, design, implementation, testing and troubleshooting skills in students regarding TCP/IP based networks and services as relevant to the computer networking needs of the IT industry
- Establish a strong conceptual foundation of the TCP/IP protocol stack, services and related tools/technologies so as to facilitate the development of the above mentioned skills
- Design and implement customized TCP/IP based application layer services.
- To familiarize with security and performance issues in TCP/IP networks
- To familiarize with Wireless Networks, WiFi and Mobile Networks, Browser Networking, XMLHttpRequest and Server-Sent Events (SSE) and WebSocket and WebRTC
- Create a strong conceptual foundation and offer maximum possible development of required theoretical and practical skills for students aspiring to make a career in Computer Networking like Network Designer, Network administrator, etc.

**2. Prerequisites:**

Digital Data communication concepts, Layered architecture as per OSI and TCP/IP model, Functionality of all layers in the OSI and TCP/IP model, Concepts of LAN, WAN, Internet, HTTP, Ethernet, General concepts in routing and basic routing algorithms like Dijkstra's shortest path, distance vector routing, link state routing, etc., Overview of popular application layer services like HTTP, DNS, FTP etc.

**3. Contents:**

<b>Unit No.</b>	<b>Chapter Details</b>	<b>Weightage</b>	<b>No. of Lecture</b>
<b>1</b>	<b>Primer on Latency and Bandwidth, Building Blocks of TCP and UDP and Transport Layer Security (TLS).</b> Speed Is a Feature, Components of Latency, Speed of Light and Propagation Latency, Last-Mile Latency, Bandwidth, Delivering Higher Bandwidth and Lower Latencies, TCP Three Way Handshaking, Congestion Avoidance and Control, Bandwidth Delay Product, Optimization for TCP,UDP and Network Address Translator, NAT Traversal, STUN, TURN and ICE. TLS Handshake, TLS Session	<b>30 %</b>	<b>12</b>

	Resumption, Chain of Trust and Certificate Authorities, Certificate Revocation, TLS Record Protocol and Optimizing for TLS.		
<b>2</b>	<b>Wireless Networks, WiFi</b> Ubiquitous Connectivity, Types of Wireless Networks, Performance Fundamentals of Wireless Networks, From Ethernet to a Wireless LAN, WiFi Standards and Features, Measuring and Optimizing WiFi Performance, Optimizing for WiFi Networks.	<b>10 %</b>	<b>8</b>
<b>3</b>	<b>Browser Networking, XMLHttpRequest and Server-Sent Events (SSE)</b> Primer on Browser Networking, XMLHttpRequest: Brief History of XHR, Cross-Origin Resource Sharing (CORS), Downloading and uploading Data with XHR, Monitoring Download and Upload Progress, Streaming Data with XHR, Server-Sent Events (SSE): EventSource API and Event Stream Protocol.	<b>30 %</b>	<b>10</b>
<b>4.</b>	<b>WebSocket and WebRTC</b> Introduction to WebSocket, WebSocket API, WebSocket Protocol, WebSocket Use Cases and Performance, WebRTC: Standards and Development of WebRTC, Audio and Video Engines, Real-Time Network Transports, Establishing a Peer-to-Peer Connection, Delivering Media and Application Data, DataChannel, WebRTC Use Cases and Performance.	<b>30 %</b>	<b>12</b>

#### 4. Text Books:

1. Ilya Grigorik, "High-Performance Browser Networking", 2013: First Edition, O'Reilly  
E-book book also available <https://hpbn.co/>

#### 5. Reference Books:

1. Douglas E. Comer, "Internetworking with TCP/IP - (Vol. 1) Principles, Protocols, and Architecture", 6<sup>th</sup> Edition, Prentice Hall of India (PHI) Publishers.
2. Behrouz A. Forouzan, "TCP/IP Protocol Suite", 4th Edition, McGraw-Hill
3. W. Richard Stevens, G. Gabrani, "TCP/IP- Illustrated, Vol. 1 (The Protocols)", Pearson Publishers.

**6. Chapter Wise Coverage from Text Book:**

<b>Unit No.</b>	<b>Text Books</b>	<b>Topics/Subtopics</b>	<b>No. of Lectures</b>
1	Book-1	Chapter 1 to Chapter 4	08
2	Book-1	Chapter 5, Chapter 6	12
3	Book-1	Chapter 14 to Chapter 16	06
4	Book-1	Chapter 17 to Chapter 18	14

**7. Accomplishments of the student after completing the course :**

- Have thorough understanding of TCP/IP based systems, services and related tools and technologies
- Be fluent in design and developing Java based TCP/IP socket based networking solutions
- Effectively use available OS commands/utilities as well as popular third party tools for TCP/IP networking depending upon the needs
- Be geared to adapt to more sophisticate networking related packages in Java and hence develop relatively complex applications more reliably and faster.