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# Computer Networks

**(Code : ECC 603)**

**Semester VI – Electronics and Computer Science**  
(Mumbai University)

Strictly as per New Choice Based Credit and Grading System Syllabus  
(Revise 2019 'C' Scheme) of Mumbai University with effective from Academic Year 2021-2022

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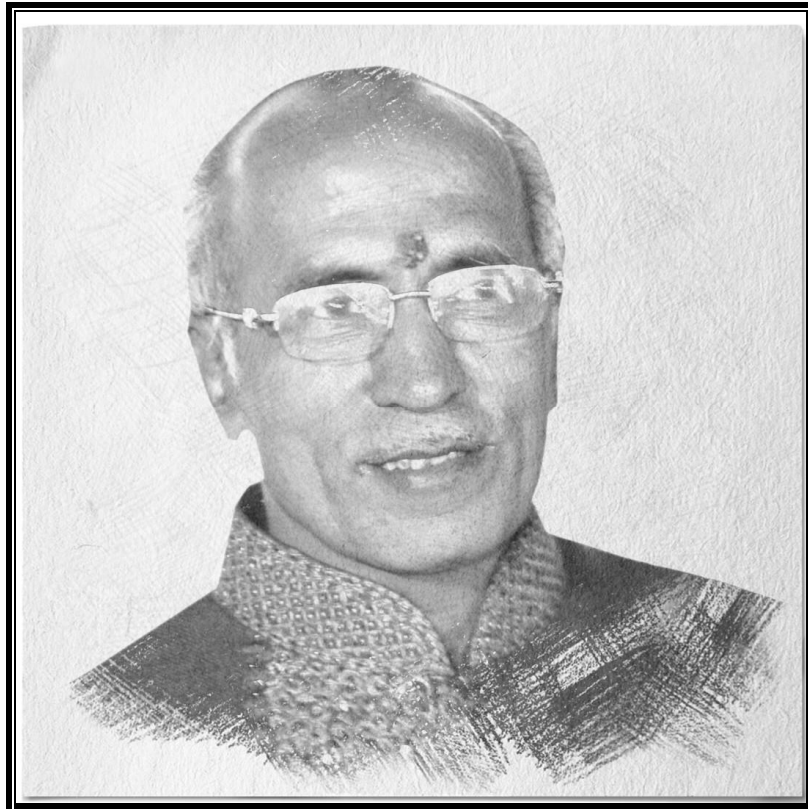
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*We dedicate this Publication soulfully and wholeheartedly,  
in loving memory of our beloved founder director,  
Late Shri. Pradeepji Lalchandji Lunawat,  
who will always be an inspiration, a positive force and strong support  
behind us.*



*“My work is my prayer to God”*

*- Lt. Shri. Pradeepji L. Lunawat*

*Soulful Tribute and Gratitude for all Your  
Sacrifices, Hardwork, and 40 years of Strong Vision...*

## Syllabus...

### Computer Networks : Sem. VI (Electronics and Computer Science, (MU))

Subject Code	Subject Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
ECC 603	Computer Networks	03	-	-	03	-	-	03

Subject Code	Subject Name	Examination Scheme									
		Theory Marks					Term duration Hours	Term Work	Practical	Oral	Total
		Internal Assessment			End Sem. Exam.						
		Test 1	Test 2	Ave. of Test 1 and Test 2							
ECC 603	Computer Networks	20	20	20	80	03	—	—	—	100	

**Course Pre-requisite :** Communication Engineering

**Course Objectives :**

1. To understand the fundamental concepts of computer networking, protocols, architectures, and applications.
2. To study the multiple layer design issues, services, and state-of-the-art protocols of TCP/IP and OSI based Architectures.
3. To help students to acquire knowledge of address in the configuration of various scales of networks
4. To be conversant with the principles of Network Application Programming

**Course Outcomes :**

- After successful completion of the course students will be able to :
1. Enumerate the layers of OSI model and TCP/IP model and describe their functions.
  2. Identify the characteristics of network devices and media used to design networks.
  3. Demonstrate the knowledge of networking protocols at various layers of TCP/IP model.
  4. Classify the routing protocols and analyse how to assign the IP addresses for a given network
  5. Design and configure the networks using IP addressing and sub-netting / super-netting schemes.
  6. Explain the functions of Application layer and Presentation layers, their paradigms and Protocols.

## Module 1

### Introduction to Data Communications and Networking :

Introduction to computer networks, Network software, Layers and services, Network topologies, Protocol hierarchies, design issues for the layers, connection oriented and connectionless services. **Reference models** : Layer details of OSI, TCP/IP models. Communication between layers. Internet. **(Refer Chapter 1)**

## Module 2

### Physical Layer :

**Guided Transmission Media** : Twisted pair, Coaxial, Fiber optics. **Unguided media (Wireless Transmission)** : Radio Waves, Microwave, Bluetooth, Infrared, Circuit and Packet Switching. **Network Devices** : Repeaters, Hubs, Switches, Routers and Gateways. **(Refer Chapter 2)**

## Module 3

### Data Link Layer :

**DLL Design Issues** : Services, Framing, Error Control, Flow Control, Error Detection and Correction Elementary Data Link protocols, Stop and Wait, **Sliding Window** : Go Back N, Selective Repeat. **Medium Access Control Sublayer** : Channel allocation problem, Multiple access protocol (Aloha, Carrier Sense Multiple Access (CSMA / CD)), **Local Area Networks** : Ethernet (802.3), **Introduction to wireless LAN** : 802.11x. **(Refer Chapters 3 and 4)**

## Module 4

### Network Layer :

Network Layer design issues. **Communication Primitives** : Unicast, Multicast, Broadcast. **Network Layer Protocols** : IPv4 datagram format, IPv4 addresses, IPv4 addressing (classful and classless), Subnetting and Supernetting design problems, IPv4 protocol, IPv6 packet format, IPv6 addressing, Transition from IPv4 to IPv6. **Routing algorithms** : **Intra-domain routing** : Shortest path, Distance vector algorithms, Link state routing, Inter-domain routing protocols. **Congestion control algorithms** : Open loop congestion control, Closed loop congestion control. QoS parameters. **(Refer Chapters 5 and 6)**

## Module 5

### Transport Layer :

**The Transport Service** : Transport service primitives, Berkeley sockets, Connection management (Handshake), UDP, TCP, TCP state transition, TCP timers. TCP flow control (Sliding window), **TCP Congestion Control** : Slow start. **(Refer Chapter 7)**

## Module 6

### Application Layer :

Application layer paradigms. **Client-Server Paradigm** : Application programming interface. **Standard Client server applications** : World Wide Web and HTTP, FTP, Electronic mail, TELNET, Secure Shell (SSH), Domain Name System (DNS). **(Refer Chapter 8)**



**Module 1****Chapter 1 : Introduction to DCN 1-1 to 1-52**

**Syllabus :** Introduction to computer networks, Network software, Layers and services, Network topologies, Protocol hierarchies, design issues for the layers, connection oriented and connectionless services. **Reference models :** Layer details of OSI, TCP/IP models. Communication between layers. Internet.

1.1	Introduction.....	1-2	1.6	Network Hardware .....	1-12
1.1.1	Computer Networks .....	1-2	1.6.1	Transmission Technology .....	1-12
1.1.2	Hardware and Software .....	1-2	1.6.2	Network Scale .....	1-12
1.1.3	Protocol .....	1-2	1.7	Network Classification by their Geography .....	1-13
1.1.4	Components of a Computer Network .....	1-3	1.7.1	Local Area Networks (LAN) .....	1-13
1.1.5	Applications of Computer Networks .....	1-3	1.7.2	Metropolitan Area Network (MAN) .....	1-14
1.2	Benefits of Computer Networks .....	1-3	1.7.3	Wide Area Network (WAN) .....	1-14
1.2.1	Disadvantages of Networks .....	1-3	1.7.4	Wireless Networks .....	1-15
1.3	Network Services / Applications .....	1-3	1.7.5	Internetworks .....	1-15
1.3.1	Service Provided to Organizations .....	1-3	1.7.6	Comparison of LAN, WAN and MAN ...	1-15
1.3.2	Services Provided to People .....	1-4	1.8	Network Classification Based on Architecture ....	1-16
1.4	Network Topology .....	1-4	1.9	Peer-to-Peer Networks .....	1-16
1.4.1	Bus Topology .....	1-5	1.9.1	When to use Peer to Peer Networks ?..	1-17
1.4.2	Ring Topology .....	1-6	1.10	Client / Server Network .....	1-17
1.4.3	Star Topology .....	1-8	1.10.1	Communication in Client-Server Configuration .....	1-17
1.4.4	Mesh Topology .....	1-9	1.10.2	Comparison between Peer-to-Peer Network and Client-Server Network .....	1-18
1.4.5	Tree Topology .....	1-10	1.11	Protocols and Standards .....	1-18
1.4.6	Logical Topology .....	1-10	1.11.1	Protocols .....	1-18
1.4.7	Hybrid Topology .....	1-10	1.11.2	Important Elements of a Protocol .....	1-19
1.4.8	Comparison of Star, Bus and Ring Topologies .....	1-11	1.11.3	Standards .....	1-19
1.4.9	Comparison of Tree and Mesh Topologies .....	1-11	1.11.4	Standard Organizations .....	1-19
1.5	Types of Communication .....	1-11	1.12	Layered Tasks .....	1-20
			1.13	Network Software .....	1-21
			1.13.1	Protocol Hierarchies (Layered Architecture).....	1-21
			1.13.2	Reasons for having Layered Protocols and its Benefits .....	1-21
			1.13.3	Disadvantages of Layered Architecture .....	1-22
			1.13.4	How does Data Transfer take Place ? .....	1-22



1.14	Network Architecture .....	1-22	1.21.3	TCP / IP Network Layer .....	1-39
1.14.1	Virtual Communication between Layers .....	1-22	1.21.4	TCP / IP Transport Layer .....	1-39
1.15	Design Issues for the Layers .....	1-23	1.21.5	TCP / IP Application Layer .....	1-40
1.16	Connection Oriented and Connectionless Services .....	1-24	1.22	Encapsulation and Decapsulation .....	1-41
1.16.1	Examples of C.O. and C.L. Services .....	1-25	1.22.1	Encapsulation at the Source Host .....	1-41
1.16.2	Comparison of C.O and C.L. Services .....	1-25	1.22.2	Decapsulation and Encapsulation at the Router .....	1-41
1.17	Interface and Services .....	1-26	1.22.3	Decapsulation at the Destination Host .....	1-42
1.17.1	Service .....	1-27	1.23	Addressing in TCP / IP .....	1-42
1.17.2	Protocol .....	1-27	1.23.1	Merits of TCP / IP model .....	1-43
1.18	Reference Models .....	1-27	1.23.2	Demerits of TCP / IP Model .....	1-43
1.19	OSI Model .....	1-27	1.23.3	Hybrid (Internet) Reference Model .....	1-43
1.19.1	Layered Architecture .....	1-27	1.23.4	Comparison of Models .....	1-43
1.19.2	Communication in OSI Model .....	1-28	1.24	Addressing .....	1-44
1.19.3	Peer to Peer Processes .....	1-29	1.24.1	MAC Address (Physical Address) .....	1-44
1.19.4	Organization of the Layers .....	1-29	1.24.2	Logical Addresses (IP Addresses) .....	1-45
1.19.5	Layer Details of OSI Model .....	1-30	1.24.3	Port Address .....	1-46
1.19.6	Exchange of Information in OSI Model .....	1-32	1.24.4	Specific Addresses .....	1-46
1.19.7	Merits of OSI Reference Model .....	1-33	1.25	Socket and Socket Address .....	1-46
1.19.8	Demerits of OSI Model .....	1-33	1.25.1	Ports and Sockets .....	1-47
1.20	The TCP / IP Reference Model .....	1-33	1.26	Internet .....	1-48
1.20.1	Introduction to TCP / IP .....	1-34	1.26.1	Net Structure .....	1-48
1.20.2	Layer Details of TCP / IP .....	1-34	1.26.2	Parts of the Internet .....	1-48
1.20.3	Description of TCP / IP Model .....	1-35	1.26.3	Services on the Internet .....	1-49
1.20.4	Layered Architecture .....	1-36	1.26.4	A Service Description .....	1-49
1.20.5	Logical Connections in the TCP / IP .....	1-36	1.26.5	Internet Protocols .....	1-49
1.20.6	Data Unit Created by Every Layer .....	1-37	1.26.6	Internet Address .....	1-50
1.21	Detailed Description of Each Layer .....	1-37	1.27	Accessing the Internet .....	1-50
1.21.1	TCP / IP Physical Layer .....	1-37	1.28	University Questions and Answers .....	1-52
1.21.2	TCP / IP Data Link Layer .....	1-38		• <b>Review Questions</b> .....	<b>1-51</b>

**Module 2****Chapter 2 : Physical Layer 2-1 to 2-32**

**Syllabus : Guided Transmission Media :** Twisted pair, Coaxial, Fiber optics. **Unguided media (Wireless Transmission) :** Radio Waves, Microwave, Bluetooth, Infrared, Circuit and Packet Switching. **Network Devices :** Repeaters, Hubs, Switches, Routers and Gateways.

2.1	Introduction to Physical Layer .....	2-2	2.8.4	Visible Light .....	2-11
2.1.1	Physical Layer Design Issues .....	2-2	2.9	Types of Wireless Media .....	2-11
2.1.2	Transmission Media and Physical Layer .....	2-2	2.9.1	Radio Wave Transmission Systems ....	2-11
2.2	Transmission Media .....	2-3	2.9.2	Microwave Transmission System .....	2-12
2.2.1	Classification of Transmission Media ....	2-3	2.9.3	Use of Infrared Light as Medium .....	2-13
2.2.2	Selection of Transmission Media .....	2-3	2.9.4	Advantages of Wireless Transmission .....	2-14
2.3	Types of Wired Media .....	2-3	2.9.5	Disadvantages of Wireless Transmission .....	2-14
2.4	Twisted Pair Cables .....	2-4	2.9.6	Comparison of Wired and Wireless Media .....	2-14
2.4.1	UTP (Unshielded Twisted Pair) .....	2-4	2.10	Wireless PAN (WPAN) IEEE 802.15 .....	2-14
2.4.2	STP (Shielded Twisted Pair) .....	2-4	2.11	Bluetooth (WPAN) (IEEE 802.15.1) .....	2-15
2.4.3	Categories of UTP .....	2-5	2.11.1	Features of Bluetooth .....	2-15
2.4.4	Comparison of Twisted Pair Cables .....	2-6	2.11.2	Bluetooth Devices and Frequency Band .....	2-15
2.5	Co-axial Cables .....	2-6	2.11.3	Principle of Bluetooth .....	2-16
2.6	Optical Fiber Cables .....	2-8	2.12	Bluetooth Architecture .....	2-16
2.6.1	Characteristics of Optical Fiber Cables ..	2-8	2.12.1	Piconets .....	2-16
2.6.2	Advantages of Optical Fibers .....	2-9	2.12.2	Scatternets .....	2-17
2.6.3	Disadvantages of Optical Fiber .....	2-9	2.12.3	Frame Format .....	2-17
2.6.4	Applications .....	2-9	2.12.4	Bluetooth Advantages .....	2-18
2.6.5	Comparison of Wired Media .....	2-9	2.12.5	Bluetooth Limitations .....	2-18
2.7	Wireless Media .....	2-10	2.12.6	Applications of Bluetooth .....	2-18
2.8	EM Spectrum for Wireless Media .....	2-10	2.13	Infrared .....	2-18
2.8.1	Communication Bands .....	2-10	2.14	Switching .....	2-18
2.8.2	The ISM Band .....	2-11	2.14.1	Switching Methods .....	2-19
2.8.3	Infrared Signals .....	2-11	2.14.2	Circuit Switching .....	2-19
			2.14.3	Circuit Switched Technology in Telephone Networks .....	2-20
			2.15	Structure of Switch .....	2-20
			2.16	Circuit Switching Concepts .....	2-21
			2.17	Packet Switching .....	2-21





<ul style="list-style-type: none"> <li>2.17.1 Datagram Packet Switching .....2-22</li> <li>2.17.2 Efficiency .....2-22</li> <li>2.17.3 Delay .....2-22</li> <li>2.17.4 Advantages of Packet Switching .....2-23</li> <li>2.17.5 Disadvantages of Packet Switching .....2-23</li> <li>2.17.6 Datagram Networks in Internet .....2-23</li> <li>2.18 Virtual Circuit Packet Switching .....2-23 <ul style="list-style-type: none"> <li>2.18.1 Three Phases of Communication .....2-23</li> <li>2.18.2 Efficiency .....2-24</li> <li>2.18.3 Delay .....2-24</li> <li>2.18.4 Advantages of Virtual Circuit Packet Switching .....2-24</li> <li>2.18.5 Disadvantages of Virtual Circuit Packet Switching .....2-24</li> </ul> </li> <li>2.19 Comparison of Message, Circuit and Packet Switching .....2-24</li> <li>2.20 Networking Devices .....2-25</li> <li>2.21 Hubs .....2-26 <ul style="list-style-type: none"> <li>2.21.1 Passive Hubs .....2-26</li> <li>2.21.2 Active Hubs .....2-26</li> <li>2.21.3 Intelligent Hubs .....2-26</li> </ul> </li> <li>2.22 Repeaters .....2-27</li> <li>2.23 Bridges .....2-27</li> <li>2.24 Routers .....2-28</li> <li>2.25 Gateways .....2-29</li> <li>2.26 Switches .....2-30 <ul style="list-style-type: none"> <li>2.26.1 Comparison of Networking Devices .....2-31</li> </ul> </li> <li>• <b>Review Questions</b> .....2-31</li> </ul>	<ul style="list-style-type: none"> <li>3.1 Introduction .....3-2 <ul style="list-style-type: none"> <li>3.1.1 Position of Data Link Layer .....3-2</li> </ul> </li> <li>3.2 Data Link Layer Design Issues .....3-2</li> <li>3.3 Services Provided to Network Layer .....3-3 <ul style="list-style-type: none"> <li>3.3.1 Types of Services Provided .....3-3</li> <li>3.3.2 Unacknowledged Connectionless Service .....3-3</li> <li>3.3.3 Acknowledged Connectionless Service .....3-3</li> <li>3.3.4 Acknowledged Connection Oriented Service .....3-4</li> </ul> </li> <li>3.4 Framing .....3-4 <ul style="list-style-type: none"> <li>3.4.1 Framing Methods .....3-4</li> <li>3.4.2 Character Count .....3-4</li> <li>3.4.3 Starting and Ending Character with Character Stuffing .....3-4</li> <li>3.4.4 Character Stuffing .....3-5</li> <li>3.4.5 Starting and Ending Flags, with Bit Stuffing .....3-5</li> <li>3.4.6 Physical Layer Coding Violations .....3-6</li> </ul> </li> <li>3.5 Error Control .....3-6 <ul style="list-style-type: none"> <li>3.5.1 Function of a Timer .....3-6</li> </ul> </li> <li>3.6 Error Detection and Correction .....3-6 <ul style="list-style-type: none"> <li>3.6.1 Encoding and Decoding .....3-7</li> <li>3.6.2 Redundancy .....3-7</li> <li>3.6.3 Classification of Error Control Techniques .....3-7</li> <li>3.6.4 Error Detection Methods .....3-7</li> <li>3.6.5 Parity Checking .....3-8</li> <li>3.6.6 Checksum Error Detection .....3-9</li> <li>3.6.7 Two Dimensional Parity Check (Block Parity) .....3-9</li> <li>3.6.8 Cyclic Redundancy Check (CRC) .....3-10</li> </ul> </li> </ul>
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<b>Module 3</b>
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**Chapter 3 : Data Link Layer****3-1 to 3-32**

<p><b>Syllabus : DLL Design Issues</b> : Services, Framing, Error Control, Flow Control, Error Detection and Correction Elementary Data Link protocols, Stop and Wait, <b>Sliding Window</b> : Go Back N, Selective Repeat.</p>
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3.6.9	CRC Checker .....	3-11	4.2.1	Static Channel Allocation .....	4-3
3.7	Error Correction .....	3-14	4.2.2	Dynamic Channel Allocation .....	4-3
3.7.1	Classification of Error-correcting Codes .....	3-15	4.3	Multiple Access .....	4-4
3.7.2	Linear Block Codes .....	3-15	4.3.1	Random Access .....	4-4
3.7.3	Hamming Codes .....	3-15	4.3.2	Evolution of Random Access Methods ..	4-4
3.7.4	ARQ Technique .....	3-18	4.3.3	Taxonomy (Classification) of Multiple Access Protocols .....	4-4
3.8	Flow Control .....	3-19	4.4	Multiple Access ALOHA System .....	4-5
3.9	Elementary Data Link Protocols .....	3-20	4.4.1	Pure ALOHA .....	4-5
3.9.1	An Unrestricted Simplex Protocol .....	3-20	4.4.2	Efficiency of an ALOHA System .....	4-6
3.9.2	A Simplex Stop and Wait Protocol .....	3-20	4.4.3	Slotted ALOHA .....	4-7
3.9.3	A Simplex Protocol for Noisy Channel ..	3-20	4.4.4	Comparison of Pure and Slotted ALOHA .....	4-8
3.9.4	Piggybacking .....	3-21	4.5	Carrier Sense Multiple Access (CSMA).....	4-9
3.10	Sliding Window Protocols .....	3-22	4.5.1	Carrier Sense Multiple Access / Collision Detection (CSMA / CD) .....	4-9
3.10.1	A One Bit Sliding Window Protocol (Stop and Wait ARQ) .....	3-24	4.5.2	CSMA / CD Procedure .....	4-10
3.10.2	A Protocol using GO Back n .....	3-26	4.5.3	CSMA / CA .....	4-11
3.10.3	Pipelining .....	3-28	4.6	Collision Free Protocols .....	4-13
3.10.4	Selective Repeat ARQ .....	3-28	4.7	Controlled Access .....	4-13
3.10.5	Protocol Performance .....	3-29	4.7.1	Reservation Systems .....	4-13
3.10.6	Comparison of Sliding Window Protocols .....	3-30	4.7.2	Polling .....	4-14
	• <b>Review Questions</b> .....	<b>3-32</b>	4.7.3	Token Passing .....	4-15
<b>Module 3</b>			4.8	Wired LANs : Ethernet Protocol .....	4-16
<b>Chapter 4 : Medium Access Control Sublayer</b>			4.9	Ethernet .....	4-16
<b>4-1 to 4-30</b>			4.9.1	Traditional Ethernet .....	4-17
<b>Syllabus : Medium Access Control Sublayer</b> : Channel allocation problem, Multiple access protocol (Aloha, Carrier Sense Multiple Access (CSMA/CD)), <b>Local Area Networks</b> : Ethernet (802.3), <b>Introduction to wireless LAN</b> : 802.11x.			4.9.2	Bridged Ethernet .....	4-17
4.1	Introduction .....	4-2	4.9.3	Switched Ethernet .....	4-17
4.1.1	MAC and LLC Sublayers .....	4-2	4.9.4	Full Duplex Ethernet .....	4-18
4.2	The Channel Allocation Problem .....	4-2	4.9.5	Fast Ethernet .....	4-18
			4.9.6	Gigabit Ethernet .....	4-18
			4.10	IEEE Standards .....	4-18



4.11	Traditional Ethernet (IEEE 802.3)	4-19
4.11.1	Traditional Ethernet Frame	4-19
4.11.2	Frame Length	4-19
4.11.3	Addressing	4-20
4.11.4	Types of Addresses	4-20
4.11.5	Physical Properties of Ethernet	4-20
4.11.6	Physical Layer Implementation of Standard Ethernet	4-20
4.12	Fast Ethernet	4-22
4.12.1	Autonegotiation	4-22
4.12.2	Physical Layer Implementation	4-22
4.13	Gigabit Ethernet	4-23
4.13.1	Physical Layer Implementation	4-23
4.13.2	Ten Gigabit Ethernet	4-23
4.13.3	Comparison of Standard and Gigabit Ethernet	4-23
4.14	Wireless LANs	4-24
4.14.1	IEEE Standards	4-24
4.14.2	Wi-Fi	4-24
4.14.3	ISM Band	4-24
4.15	Wi-Fi (IEEE 802.11)	4-24
4.15.1	Classification of WLANs	4-25
4.15.2	The IEEE 802.11 Protocol Stack	4-25
4.15.3	802.11 Network Architecture	4-26
4.15.4	Types of Stations	4-27
4.16	Problems in Wireless LAN	4-27
4.16.1	Hidden Terminal Problem	4-27
4.16.2	Exposed Station Problem	4-27
4.17	University Questions and Answers	4-28
	• <b>Review Questions</b>	<b>4-28</b>

**Module 4****Chapter 5 : Network Layer****5-1 to 5-40**

**Syllabus** : Network Layer design issues. **Communication Primitives** : Unicast, Multicast, Broadcast. **Routing algorithms** : **Intra-domain routing** : Shortest path, Distance vector algorithms, Link state routing, Inter-domain routing protocols. **Congestion control algorithms** : Open loop congestion control, Closed loop congestion control. QoS parameters.

5.1	Network Layer	5-2
5.1.1	Network Layer Duties	5-2
5.2	Network Layer Design Issues	5-2
5.2.1	Store and Forward Packet Switching	5-3
5.2.2	Services Provided to the Transport Layer	5-3
5.2.3	Implementation of Connectionless Service	5-3
5.2.4	Implementation of Connection-Oriented Service	5-4
5.2.5	Internal Organization of the Network Layer	5-5
5.2.6	Comparison of Virtual Circuit and Datagram Subnets	5-5
5.3	Routing in Packet Switching Network	5-5
5.3.1	Characteristics	5-5
5.3.2	Performance Criteria	5-6
5.4	Routing	5-6
5.4.1	Types of Routing	5-6
5.4.2	Intra and Interdomain Routing	5-7
5.4.3	Unicast Routing	5-7
5.4.4	Broadcast Routing	5-8
5.4.5	Multicast Routing	5-8
5.5	Routing Algorithms	5-8



5.5.1	Desired Properties of a Routing Algorithm .....	5-9	5.15.1	Need of Congestion Control .....	5-30
5.5.2	Types of Routing Algorithms .....	5-9	5.15.2	Causes of Congestion .....	5-30
5.5.3	Optimality Principle .....	5-9	5.15.3	Difference between Congestion Control and Flow Control .....	5-31
5.6	Static Algorithms .....	5-10	5.15.4	Principle of Congestion Control .....	5-31
5.6.1	Shortest Path Routing .....	5-10	5.16	Congestion Prevention Policies .....	5-32
5.6.2	Flooding .....	5-10	5.16.1	Congestion Control in Virtual Circuit Subnets .....	5-33
5.7	Dynamic Routing Algorithms .....	5-11	5.16.2	Approaches to Congestion Control .....	5-33
5.8	Distance Vector Routing Algorithm .....	5-11	5.16.3	Congestion Control in Datagram Subnets .....	5-35
5.8.1	Disadvantages .....	5-12	5.17	Quality of Service (QoS) .....	5-36
5.8.2	Looping in Distance Vector Routing Protocol .....	5-12	5.17.1	Techniques for Achieving Good QoS ...	5-37
5.8.3	Count to Infinity Problem .....	5-13	5.17.2	Traffic Shaping .....	5-37
5.8.4	Split Horizon Algorithm .....	5-14	5.17.3	Leaky Bucket Algorithm .....	5-37
5.9	Link State Routing .....	5-14	5.17.4	Token Bucket Algorithm .....	5-38
5.9.1	Advantage of LSR .....	5-15	5.17.5	Combination of Token Bucket and Leaky Bucket .....	5-39
5.9.2	Comparison of Link State Routing and Distance Vector Routing .....	5-16	5.17.6	Resource Reservation .....	5-39
5.9.3	Advantages and Disadvantages of Dynamic Routing .....	5-16	5.17.7	Admission Control .....	5-40
5.10	Least Cost Algorithms .....	5-16		<b>• Review Questions .....</b>	<b>5-40</b>
5.10.1	Dijkstra's Algorithm .....	5-17	<b>Module 4</b>		
5.11	Bellman-Ford Algorithm .....	5-21	<hr/>		
5.12	Path Vector Routing .....	5-27	<b>Chapter 6 : Network Layer Protocols                      6-1 to 6-40</b>		
5.12.1	Path Vector Messages .....	5-27	<b>Syllabus : Network Layer Protocols</b> : IPv4 datagram format, IPv4 addresses, IPv4 addressing (classful and classless), Subnetting and Supernetting design problems, IPv4 protocol, IPv6 packet format, IPv6 addressing, Transition from IPv4 to IPv6.		
5.12.2	Loop Prevention .....	5-28	6.1	Network Layer Protocols .....	6-2
5.12.3	Path Attributes .....	5-28	6.1.1	Why IP Address ? .....	6-2
5.13	Unicast Routing Protocols .....	5-28	6.1.2	Logical Addresses (IP Addresses) .....	6-2
5.13.1	Routing .....	5-28	6.2	Internet Protocol Version 4 (IPv4) .....	6-3
5.13.2	Cost or Metric .....	5-28	6.2.1	Position of IP .....	6-3
5.13.3	Routing Tables .....	5-28			
5.14	Network Layer Congestion .....	5-29			
5.15	Congestion Control .....	5-29			



6.2.2	Internet Protocol (IP) .....	6-3	6.6	Classless Addressing in IPv4 .....	6-22
6.2.3	Various Network Layer Protocols .....	6-4	6.6.1	Variable Length Blocks .....	6-23
6.2.4	IPv4 Header Format .....	6-4	6.6.2	The Slash Notation (CIDR Notation) ....	6-24
6.3	Fragmentation .....	6-8	6.6.3	Network Mask .....	6-24
6.3.1	Transparent Strategy .....	6-9	6.6.4	Extracting the Block Information .....	6-24
6.3.2	Non-transparent Strategy .....	6-9	6.6.5	Block Allocation .....	6-28
6.3.3	Maximum Transfer Unit (MTU) .....	6-10	6.6.6	Relation to Classful Addressing .....	6-28
6.3.4	Fields Related to Fragmentation .....	6-10	6.6.7	Subnetting .....	6-28
6.4	IPv4 Addresses .....	6-11	6.6.8	Designing Subnets .....	6-28
6.4.1	Uniqueness of IP Addresses .....	6-11	6.6.9	Finding Information about Each Network .....	6-29
6.4.2	Address Space .....	6-11	6.6.10	Address Aggregation .....	6-29
6.4.3	Notation .....	6-11	6.7	Special Addresses .....	6-31
6.4.4	IPv4 Address Format .....	6-11	6.7.1	Special Blocks .....	6-31
6.5	Classful Addressing .....	6-11	6.7.2	All Zeros Address .....	6-31
6.5.1	IPv4 Address Classes .....	6-12	6.7.3	All one Address-Limited Broadcast Address .....	6-31
6.5.2	Formats of Various Address Classes ...	6-12	6.7.4	Loopback Address .....	6-31
6.5.3	How to Recognize Address Classes ? ..	6-13	6.7.5	Private Addresses .....	6-31
6.5.4	Two Level Addressing .....	6-13	6.7.6	Multicast Addresses .....	6-31
6.5.5	Extracting Information in a Block .....	6-14	6.7.7	Special Addresses in Each Block .....	6-31
6.5.6	Network Address .....	6-14	6.7.8	Network Address .....	6-31
6.5.7	Network Mask or Default Mask .....	6-15	6.7.9	Direct Broadcast Address .....	6-32
6.5.8	Default Masks for Different Classes ....	6-15	6.7.10	Options.....	6-32
6.5.9	Finding Network Address using Default Mask .....	6-16	6.8	IPv6 (Next Generation IP) .....	6-32
6.5.10	ThreeLevel Addressing Subnetting .....	6-16	6.8.1	Advantages of IPv6 .....	6-33
6.5.11	Special IP Addresses .....	6-17	6.9	IPv6 Addressing .....	6-33
6.5.12	Limitations of IPv4 .....	6-17	6.9.1	IPv6 Address .....	6-33
6.5.13	Classless Addressing .....	6-18	6.9.2	Notations .....	6-33
6.5.14	Supernetting .....	6-18	6.9.3	Abbreviation .....	6-34
6.5.15	Registered and Unregistered Addresses .....	6-18	6.10	IPv6 Packet Format .....	6-35
6.5.16	Solved Examples .....	6-19	6.10.1	Payload .....	6-35



6.10.2	NAT – Network Address Translation	6-36
6.10.3	Extension Headers	6-36
6.11	Transition from IPv4 to IPv6	6-37
6.11.1	Transition Strategies	6-38
6.11.2	Use of IP Addresses	6-39
6.12	Comparison between IPv4 and IPv6	6-39
6.13	Internet Control Protocols	6-40
	• <b>Review Questions</b>	<b>6-40</b>

<b>Module 5</b>
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<b>Chapter 7 : Transport Layer</b>	<b>7-1 to 7-38</b>
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<p><b>Syllabus : The Transport Service :</b> Transport service primitives, Berkeley sockets, Connection management (Handshake), UDP, TCP, TCP state transition, TCP timers. TCP flow control (Sliding window), <b>TCP Congestion Control</b> : Slow start.</p>
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7.1	Introduction	7-2
7.2	Transport Layer Duties	7-2
7.3	Transport Layer Services	7-3
7.3.1	Process-to-Process Communication	7-3
7.3.2	Addressing Port Number	7-3
7.3.3	Encapsulation and Decapsulation	7-5
7.3.4	Multiplexing and Demultiplexing	7-5
7.3.5	Flow Control	7-5
7.3.6	Flow Control at Transport Layer	7-6
7.3.7	Error Control	7-7
7.3.8	Combination of Flow and Error Control	7-8
7.3.9	Connectionless and Connection Oriented Services (CLTS & COTS)	7-9
7.3.10	Quality of Service (QoS)	7-10
7.4	Transport Service Primitives	7-11
7.5	Sockets	7-12

7.5.1	Socket Types	7-13
7.5.2	Berkeley Sockets	7-13
7.6	Elements of Transport Protocols	7-14
7.7	Connection Management	7-14
7.7.1	Connection Establishment	7-14
7.7.2	Three Way Handshake Technique	7-15
7.7.3	Connection Release	7-16
7.7.4	The Internet Transport Protocols	7-17
7.8	User Datagram Protocol (UDP)	7-17
7.8.1	Responsibilities of UDP	7-17
7.8.2	Advantages of UDP	7-17
7.8.3	User Datagram	7-18
7.8.4	UDP Pseudo Header	7-19
7.9	UDP Services	7-20
7.9.1	Process to Process Communication	7-21
7.9.2	Connectionless Services	7-21
7.9.3	Flow and Error Control	7-21
7.9.4	Checksum	7-21
7.9.5	Congestion Control	7-21
7.10	UDP Applications	7-21
7.11	Transmission Control Protocol (TCP)	7-22
7.11.1	Relationship Between TCP and IP	7-22
7.11.2	Ports and Sockets	7-23
7.12	TCP Services	7-23
7.12.1	Process to Process Communication	7-24
7.12.2	Stream Delivery Service	7-24
7.12.3	Sending and Receiving Buffers	7-24
7.12.4	Bytes and Segments	7-24
7.13	Features of TCP	7-25
7.13.1	Numbering System	7-25
7.13.2	Flow Control	7-25
7.13.3	Error Control	7-25



7.13.4	Congestion Control .....	7-25	8.3	Application Layer Paradigms .....	8-3
7.14	The TCP Protocol .....	7-26	8.3.1	Traditional Paradigm Client Server .....	8-3
7.14.1	TCP Segment .....	7-26	8.3.2	New Paradigm Peer-to-Peer (P2P) .....	8-4
7.14.2	The TCP Segment Header .....	7-26	8.3.3	Mixed Paradigm .....	8-5
7.14.3	Checksum .....	7-28	8.4	Client Server Paradigm .....	8-5
7.14.4	Encapsulation .....	7-28	8.4.1	Application Programming Interface (API) .....	8-5
7.15	A TCP Connection .....	7-29	8.4.2	Types of APIs .....	8-5
7.15.1	TCP Connection Establishment .....	7-29	8.5	Domain Name System (DNS) .....	8-6
7.15.2	Connection Termination Protocol .....	7-29	8.5.1	How does DNS Work ? .....	8-6
7.15.3	TCP Connection Management .....	7-30	8.5.2	Name Space .....	8-6
7.15.4	TCP Connection Release .....	7-31	8.5.3	Flat Name Space .....	8-6
7.16	TCP State Transition Diagram .....	7-31	8.5.4	Hierarchical Name Space .....	8-6
7.17	Flow Control in TCP .....	7-32	8.6	Domain Name Space .....	8-7
7.17.1	Silly Window Syndrome .....	7-33	8.7	Distribution of Name Space .....	8-8
7.17.2	Nagle's Algorithm .....	7-33	8.7.1	Hierarchy of Name Servers .....	8-8
7.18	TCP Congestion Control .....	7-34	8.8	DNS in the Internet .....	8-9
7.18.1	Slow Start Algorithm .....	7-35	8.8.1	Generic Domains .....	8-9
7.19	TCP Timer Management .....	7-35	8.8.2	Country Domain .....	8-10
7.19.1	Other Timers in TCP .....	7-36	8.8.3	Inverse Domain .....	8-10
7.20	Comparison of UDP and TCP .....	7-37	8.9	Name Address Resolution .....	8-10
	• Review Questions .....	7-37	8.9.1	Recursive Resolution .....	8-10
			8.9.2	Iterative Resolution .....	8-11
			8.9.3	The DNS Message Format .....	8-12
			8.9.4	Caching .....	8-12
			8.9.5	DNS Records .....	8-12
			8.10	World Wide Web (WWW) .....	8-13
			8.10.1	Web from the Users Side .....	8-14
			8.10.2	Web from the Servers Side .....	8-15
			8.10.3	WWW Architecture .....	8-15
			8.10.4	Browser (Web Client) .....	8-16
			8.10.5	Server .....	8-16

**Module 6**

**Chapter 8 : Application Layer** **8-1 to 8-34**

**Syllabus** : Application layer paradigms. **Client-Server Paradigm** : Application programming interface. **Standard Client server applications** : World Wide Web and HTTP, FTP, Electronic mail, TELNET, Secure Shell (SSH), Domain Name System (DNS).

8.1	Introduction .....	8-2
8.1.1	Position of Application Layer .....	8-2
8.2	Providing Services .....	8-2
8.2.1	Standard and Non-standard Protocols ...	8-3



8.10.6	Uniform Resource Locator (URL) .....	8-16	8.15.3	Components of E-mail System .....	8-26
8.10.7	Cookies User-Server Interaction .....	8-16	8.15.4	SMTP Commands .....	8-26
8.11	Web Documents .....	8-17	8.15.5	SMTP Operation .....	8-26
8.11.1	Static Documents .....	8-17	8.15.6	Comparison of HTTP and SMTP .....	8-27
8.11.2	HTML (Hypertext Markup Language) .....	8-17	8.16	Message Access Agent POP and IMAP .....	8-27
8.11.3	Dynamic Document .....	8-18	8.16.1	POP 3 .....	8-27
8.11.4	Common Gateway Interface (CGI) .....	8-18	8.16.2	IMAP4 .....	8-28
8.11.5	Active Documents .....	8-18	8.17	File Transfer Protocol (FTP) .....	8-28
8.12	HTTP (Hypertext Transfer Protocol) .....	8-19	8.17.1	Communication in FTP .....	8-29
8.12.1	Principle of HTTP Operation .....	8-19	8.17.2	File Types .....	8-30
8.12.2	The Web and HTTP .....	8-19	8.17.3	Data Structure .....	8-30
8.12.3	Non-persistent and Persistent Connection .....	8-20	8.17.4	Transmission Mode .....	8-30
8.12.4	HTTP Messages .....	8-21	8.17.5	File Transfer .....	8-30
8.13	Proxy Server .....	8-21	8.18	Remote Login TELNET and SSH .....	8-30
8.13.1	HTTP Security .....	8-22	8.18.1	TELNET .....	8-31
8.14	Electronic Mail .....	8-22	8.18.2	Network Virtual Terminal (NVT) .....	8-32
8.14.1	E-mail Architecture and Services .....	8-22	8.18.3	Security Problems of TELNET .....	8-32
8.14.2	Message Formats .....	8-23	8.19	Secure Shell (SSH) .....	8-32
8.15	Message Transfer Agent SMTP .....	8-25	8.19.1	Port Forwarding .....	8-33
8.15.1	Commands and Responses .....	8-25	8.19.2	SSH Packet Format .....	8-33
8.15.2	SMTP (Simple Mail Transfer Protocol) .....	8-25	8.19.3	Comparison of TELNET and SSH.....	8-33
				• <b>Review Questions</b> .....	<b>8-34</b>

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