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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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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…

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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)**

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Module 1

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.

Module 2

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.

Syllabus : 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.

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.

Module 4

Syllabus : 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.

Syllabus : 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.

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