

COMPUTER NETWORKS (ICS-604)

Teacher Name:

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Course Structure

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Prerequisite:

Course Content:

Unit-1:

Introduction Concepts: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design – Delay Analysis, Back Bone Design, Local Access Network Design. Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

Unit-2:

Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

Unit-3:

Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP - IP packet, IP address, IPv6. '

Unit-4:

Transport Layer: Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data Compression techniques, cryptography - TCP - Window Management.

Unit-5:

Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application, Example Networks - Internet and Public Networks.

Lecture Plan

SN	Name of Topic	No. of lectures
1.	Introduction Concepts: Goals and Applications of Networks	1
2.	Network structure and architecture	1
3.	The OSI reference model, services	2
4.	Network Topology Design – Delay Analysis	1
5.	Back Bone Design, Local Access Network Design	1
6.	Physical Layer Transmission Media	2
7.	Switching methods	2
8.	ISDN, Terminal Handling.	1
9.	Medium Access sub layer: Medium Access sub layer	1
10.	Channel Allocations	2
11.	LAN protocols - ALOHA protocols	2
12.	Overview of IEEE standards - FDDI	1
13.	Data Link Layer - Elementary Data Link Protocols	2
14.	Sliding Window protocols, Error Handling	3
15.	Network Layer: Network Layer - Point - to Pont Networks	1
16.	Routing, Congestion control Internetworking -TCP / IP	2
17.	IP packet, IP address, IPv6	2
18.	Transport Layer: Transport Layer - Design issues	2
19.	Connection management, session Layer-Design issues	2
20.	Remote procedure call. Presentation Layer-Design issues	2
21.	Data Compression techniques, cryptography - TCP - Window Management	2
22.	Application Layer: Application Layer: File Transfer	1
23.	Access and Management, Electronic mail	2
24.	Virtual Terminals, Other application	1
25.	Example Networks - Internet and Public Networks.	1

Text and References Books:

1. Forouzen, "Data Communication and Networking", TMH
2. A.S. Tannenbaum, "Computer Networks", 3rd Edition, Prentice Hall India, 1997.
3. S. Keshav, "An Engineering Approach on Computer Net working", Addison Wesley, 1997
4. W. Stallings, "Data and Computer Communication", Mac-millan Press, 1989

Web Links

<https://nptel.ac.in/courses/106105081/>

<https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-829-computer-networks-fall-2002/lecture-notes/>

Course Outcomes:

1. Explain the functions of the different layer of the OSI Protocol. (Understand)
2. Design of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) based on available network devices. (Apply, Analyze)
3. Develop network programming application for a given problem related to TCP/IP protocol stack. (Apply, Analyze)
4. Understand and analyze different routing algorithms. (Understand, Analyze)
5. Understand the use of IP addressing schemes as per IPV4 and IPV6. (Understand)
6. Modify the existing protocols of TCP/IP protocol stack for performance improvement. (Apply, Analyze)

Assignments

Assignment #1

- 1) Explain the functionality of each layer in OSI reference model.
- 2) Discuss various switching methods in detail and differentiate between Circuit switching and Message switching.
- 3) What are the three fundamental characteristics that determine the effectiveness of the data communication system?
- 4) How many cable rings are required for connecting n devices using mesh, star, ring, and bus topology?
- 5) Calculate the required bandwidth if in a communication channel the signal power is 10 watt and information transmission rate is 10 mpbs.

Assignment #2

- 1) How does an FDDI node determine whether it can send asynchronous traffic and synchronous traffic?
- 2) Mention the advantage and disadvantage of error correction by receiver, as compared to error detection.
- 3) Discuss the framing technique used in HDLC. What is the effect of errors on this framing?
- 4) Discuss the problems encountered in applying CSMA/CD algorithm to wireless LANs. How do 802.11 specifications solve these problems?
- 5) Discuss the Pure ALOHA and Slotted ALOHA in detail.
- 6) Explain the sliding window protocol in detail?

Assignment #3

- 1) Discuss briefly about RIP and OSPF.
- 2) What are the major duties of Network layer?
- 3) What are the difference between IPv4 and IPv6? And draw the header format of IPv4.
- 4) Discuss the various congestion control techniques.

- 5) What do you mean by classfull and classless addressing? Explain with example.

Assignment #4

- 1) Explain 3-way handshaking.
- 2) What the steps for creating connection in TCP.
- 3) Write down difference between TCP and UDP and which protocol is used for reliable transmission.
- 4) Discuss the functions of transport layer.
- 5) What are the various data compression techniques?

Assignment #5

- 1) Explain SMTP can handle transfer of video and images. Also explain the advantages of IMAP4 and POP mail access protocol.
- 2) Write short notes on following..
 - a) Video compression
 - b) Audio compression
 - c) Firewall and its use
 - d) IP security
- 3) Discuss the RSA algorithm and why it is used.
- 4) Explain the terms- FTP, TFTP, HTTP.
- 5) What do you mean by Virtual Terminal.