

BITS-Pilani, Hyderabad Campus

First Semester 2021-2022

Course Handout (Part - II)

Date: 20/08/2021

In addition to Part I (General Handout for all courses appended to the Timetable) this portion gives further specific details regarding the course.

Course Number : CS F303
Course Title : Computer Networks
Instructor-in-charge : Gopal Krishna Kamath M

1. Course Description:

The course initially deals with the big picture of networks with discussion on evolution of network concepts in telegraph, telephone, and computer networks. The layered approach of information transmission is also discussed, with detailed emphasis on some important layers. These concepts are used to understand the next generation networks.

2. Scope and Objective:

Computer networks are one of the fastest growing areas today. The course introduces the concepts and mechanisms underlying modern telecommunication systems and networks. The course is designed in such a way that the course is accessible to students with minimum technical background in this area. The OSI model is used as a framework to introduce different protocols and standards. Each layer is covered in sufficient detail. Finally some advanced concepts related to all layers are discussed. The course will prepare the student in the areas of telecommunication switching systems, computer networks, and internetworking.

3. Text Books:

T1: James F. Kurose and Keith W. Ross; Computer Networking: A Top-Down Approach; Pearson; Sixth Edition; 2013.

T2: Dimitri Bertsekas and Robert Gallager; Data Networks; PHI; Second Edition; 2009.

4. Reference Book:

R1: Andrew S Tanenbaum; Computer Networks; Pearson; Fourth Edition; 2006

R2: L. Peterson and B. Davie; Computer Networks: A Systems Approach; MK; Fourth Edition; 2007.

5. Course Plan / Schedule:

SI No.	Topics to be covered	Learning Objectives	Chapter in the Text Book	No. of lectures
1	Introduction: Uses of computer networks, Network hardware: network edge, network core, access networks	Usage of computer networks and its hardware structure	T1(1)	2

2	ISPs and Internet backbone, delay and loss in packet switched networks, network software: protocol hierarchies and their service models	Internet architectures, performance bottlenecks and software architecture	T1(1)	2
3	Reference Models (OSI, TCP/IP)	Example protocol stacks	T1(1)	1
4	Application layer: Hypertext Transfer Protocol, HTTP message format, cookies, conditional GET	World Wide Web and its application layer protocol	T1(2)	2
5	Simple Mail Transfer Protocol, Domain Name Systems (DNS)	Email application and domain name systems	T1(2)	2
6	Socket Programming with TCP and with UDP	Socket API for building applications	T1(2)	2
7	Transport layer fundamentals: reliable and unreliable principles	Transport layer: multiplexing, demultiplexing, UDP, principles of reliable data transfer	T1(3), R1(6)	2
8	TCP: segment structure, RTT estimation and timeout, TCP flow control	Flow control mechanism and round trip time estimation	T1(3), R1(6), R2(5)	2
9	Understanding the principles behind reliable packet delivery	TCP error control and congestion control	T1(3), R2(6)	2
10	Network layer: Virtual circuits and datagram networks. What is inside a router? Forwarding and addressing in the Internet	Learning various types of services at network layer	T1(4), R1(5)	2
11	Routing algorithms: shortest path, flooding, link state, distance vector and hierarchical routing	Learning different approaches to find paths within a subnet	T1(4), R1(5)	3
12	Routing in the Internet: RIP, OSPF, Border Gateway Protocol and multicasting	Example routing in real Internet	T1(4), R1(5)	3
13	Data link layer: services, error detection and correction techniques	Features of data link layer and its importance in a network stack	T1(5), R1(3)	2
14	Multiple Access Protocols: ALOHA, Slotted ALOHA, CSMA, Local Area Networks	Various protocols at MAC layer to control access to the broadcast medium	T1(5), R1(4)	3

15	Physical Media: Theoretical basis for data communication	Physical layer characteristics and link types	R1(2)	1
16	Delay models in data networks: Little's theorem, Kendall's notation, M/M/1 and M/G/1 queuing systems	Queueing-theoretic analysis of computer networks	T2(3)	11

5. Evaluation Scheme:

Component	Duration	Weightage	Marks	Date & Time	Nature of Component
Mid-semester Exam	90 mins	30%	90	23/10/2021 3.30 - 5.00PM	Open Book
Assignment	NA	15%	30	TBA	Open Book
Seminar	TBA	15%	60	TBA	Open Book
Comprehensive Exam	120 mins	40%	120	28/12 AN	Open Book
Total		100%	300		

6. Chamber Consultation Hour: Via Google Meet. Schedule to be announced in class/CMS.

7. Make-up Policy: Make-up will be given only for genuine reasons upon receipt of appropriate proof. For foreseeable circumstances, prior application should be made for seeking the make- up examination.

8. Notices: All notices concerning the course will be put up on CMS.

9. Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**INSTRUCTOR IN-CHARGE
CS F303**