



# Department of Computer Applications

## National Institute of Technology, Jamshedpur

(An Institution of national importance under MHRD, Govt. of India)

Autumn Semester Session 2020– 2021

Date: 25/08/2020

### Course Handout

<b>Batch</b>	:	<b>MCA (3<sup>rd</sup> Semester)</b>
<b>Course Code</b>	:	<b>CA3302</b>
<b>Course Title</b>	:	<b>Computer Communication and Networks (CCN)</b>
<b>Faculty In-Charge</b>	:	<b>Dr. Chandrashekhar Azad</b>
<b>Email</b>	:	<b>csazad.ca@nitjsr.ac.in</b>
<b>Contact No.</b>	:	<b>9430148516</b>

### Course Description:

Introduction: Advantages of networks, structure of the communications network, point-to-point and multidrop circuits, data flow and physical circuits, network topologies, topologies and design goals, Hierarchical topology, horizontal topology (Bus), star topology, ring topology, mesh topology. Telephone network, switched and non-switched options, analog and digital worlds, digital signals, asynchronous and synchronous transmission.

*Layered Protocols and the OSI model:* Goals of Layered Protocols, communication between layers, standards organizations, Layers of OSI, OSI status. The Physical Layer: Digital communications, Data Link Layer Protocol, Error Correction and Detection techniques, Flow control.

*Switching and Routing in Networks* Message switching, Packet routing, packet switching support to circuit switching networks. *Polling / Selection Protocols* : Character and bit protocols, binary synchronous control (BSC) HDLC, HDLC options, HDLC frame format, code transparency and synchronization, HDLC transmission process, HDLC subsets, SDLC, Protocol conversion. WAN: Wide area and local networks, connection oriented and connectionless networks, classification of communications protocols, TDMA, TDM, CSMA, CSMA/CD, token passing, peer-to-peer priority systems, priority slot.

Routing: Network Layer: Point-to Point networks, routing algorithms, congestion control algorithms, internetworking.

*TCP/IP:* TCP/IP and internetworking, related protocols ports and sockets. IP address structure, major features of IP, IP datagram. Major IP services. IP source routing, value of the transport layer, TCP, Major features of TCP, passive and active operation, the transmission control block (TCB), route discovery protocols, examples of route discovery protocols, application layer protocols.

### Scope and Objective:

- ➔ This course on CCN aims at providing a sound conceptual foundation with emphasis on the design aspects while adopting combination of the systems and top-down approaches.
- ➔ The course attempts to provide a balanced and in-depth treatment of the state-of-the-art in the area and thus prepares the students for taking more rigorous and specialized courses in this and related fields.
- ➔ At the end of this course, students should be able to analyse, design and build simple networks and internetworks apart from acquiring due conceptual understanding of the popular TCP/IP Network Architecture.

### Text Books:

T1: Behrouz A. Forouzan, “Data Communications Networking”, 5<sup>th</sup> Edition, TMH Publication, 2015.

T2: James F. Kurose & Keith W. Ross, “Computer Networking: A Top-Down Approach”, 6<sup>th</sup> Edition, Pearson, 2015.

### Reference Books:

R1: William Stallings, “Data and Computer Communication”, 9<sup>th</sup> Edition, Pearson Education, 2014.

R2: Larry L. Peterson & Bruce S. Davie, “Computer Networks: A Systems Approach”, 5<sup>th</sup> Edition, Morgan Kaufmann / Elsevier, 2012.

R3: A.S. Tanenbaum, D.J. Wetherall, “Computer Networks”, 5<sup>th</sup> Edition, Pearson Education, 2014.

**Course Plan:**

Lecture No.	Learning Objectives	Topics to be covered	Refer to Chapters (Text Book)
1-2	Introduction	Data Communications, Networks, The Internet, Protocols and Standards, Network Hardware and Software	T1:1; T2:1
3-5	Network Models	Protocol Layering, OSI Model, TCP/IP Protocol Suite, Comparison, Addressing	T1:2; T2:1
6-9	Physical Layer and Media	Analog and Digital Signals, Transmission impairment, Data rate limits, Performance, Guided and Wireless Transmission	T1:3
10-12	Digital Transmission	Digital to Digital and Analog to Digital conversion, Transmission Modes	T1:4
13-15	Transmission media	Bandwidth utilization, Multiplexing, Spread spectrum, Guided and Unguided wireless media	T1:6, 7; T2:6
16-19	Switching	Circuit-Switched networks, Datagram networks, Virtual-Circuit networks, Structure of a switch	T1:8; T2:1
20-25	Data Link Layer	Link Layer addressing, Error Detection and correction, Data Link control (DLC), Sliding Window Protocols, HDLC, PPP, Multiple accesses, MAC, Wired LANs: Ethernet, Wireless LANs and WANs, Virtual-Circuit Networks	T1:9,10,11, 12,13,14,15, 16,1;T2:5,6
26-30	Network Layer	Packet switching, Logical Addressing, Internet Protocol, Address mapping, Error reporting, Congestion Control Algorithms, Multicasting, Delivery, Forwarding and Routing, Routing protocols, Next generation IP, Quality of Service	T1:18,19,20, 21,22; T2:4
31-34	Transport Layer	Process-to-Process Delivery: UDP, TCP and SCTP, Congestion Control and Quality of Service, Performance Issues	T1:23,24; T2:3
35-38	Application layer	Domain Name System, Remote logging, Electronic Mail and File Transfer, WWW and HTTP, Network Management: SNMP, Multimedia, Streaming Audio and Video, Content Delivery	T1:25,26,27, 28; T2: 2,7,9
39-41	Security	Cryptography, Network Security, Security in the Internet: IPSec, SSL/TLS, PGP, VPN, Firewalls, Authentication Protocols, Web Security, Social Issues	T1:31,32; T2:8
42-45	Revision and Problem solving	Revision	--

**Evaluation Scheme (EC):**

EC No.	Evaluation Component	Duration	Weightage	Date & Time	Nature of Component
1.	Mid Term Examination	02 Hours	30%	Academic Calendar	Closed Book
2.	End Term Examination	03 Hours	40%	Academic Calendar	Closed Book
3.	Internal Assessment	--	30%	TBA	(Class Test, Attendance, Assignments/Reports/Projects/Seminars)

→ **Online consultation hour:** Monday to Friday, 5PM to 6PM, Online

→ **Notices:** All notices regarding the course will be displayed only on the Department of Computer Applications notice board

Faculty In-Charge  
(CA3302)