

Subject Code: 01IT0301

Subject Name: Data Communication and Networking

B.Tech. Year – II

Objective: Students are expected to learn basics of Communication Technologies and data communication which will help them to build fundamentals for learning Computer Networks in higher semester. The course is designed to let students demonstrate an understanding of the fundamentals of data communication, types of transmission mediums and interfacing standards along with current edge of the data compression techniques.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able to

- Understand importance of data communication systems and fundamentals. (Understand)
- Distinguish and relate various physical Medias, interfacing standards and adapters. (Analyze)
- Evaluate various flow control techniques. (Evaluate)
- Apply various modulation technique in analog and digital career system (Apply)
- Understand Physical layer of LAN, MAN and WAN. (Understand)
- Analyse short range and long range wireless technologies. (Analyze)

Pre-requisite of course: Digital Electronics

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW)	
3	0	2	4	50	30	20	25	25	150

Contents:

Unit	Topics	Content Hours
1	Signal Characteristic: Analog and Digital, Periodic Analog Signals, Digital Signals, Transmission Impairments, Data rate limits, Performance	4
2	Data Communication: Basics of data communication, Networks, Internet and protocol standards, OSI, TCP-IP models.	5
3	Signal Encoding Techniques: Digital to digital Conversion, Data transmission modes, Analog to analog transmission, Digital to analog transmission.	7
4	Bandwidth Utilization: Multiplexing and Spreading Frequency division multiplexing (FDM), Time division multiplexing (TDM), T1 multiplexing hierarchy, E1 multiplexing hierarchy, Statistical TDM, Spread Spectrum, SONET/ SDH	7
5	Transmission Media: Guided media, optical fibre, wireless media	2
6	Switching System and Communication Networks: Circuit Switching, Datagram and virtual network, structure of switch networks, Telephone network, Modem and DSL, cable TV networks	6
7	Wireless WAN: Cellular telephone, Satellite communication,	3
8	Communication Technologies: Ethernet, Bluetooth, WIFI, RF, Infrared, Zigbee, NFC	3
9	Data Link Control: Framing, Flow and error control, protocols, noiseless channels, noisy channel, HDLC, Point to Point Protocol	5
	Total Hours	42

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Create	Evaluate	Analyze	Apply	Understand	Remember
0%	10%	25%	20%	35%	10%

Suggested List of Experiments:

- a) Perform pulse coded modulation for analog to digital conversion. Analyze bandwidth requirement, data rate generation, synchronous and asynchronous mode of transmission.
- b) Perform bandwidth utilization technique time division multiplexing.
- c) Perform various line coding formats and compare transmission characteristic of each format.
- d) Perform digital carrier modulation techniques used in wireless communication.
- e) Perform amplitude modulation and demodulation.
- f) Perform serial data communication between two data terminal equipment using optical link.
- g) Perform digital data transfer through RF transmitter and receiver.
- h) Demonstration of different types of cables used in data communication.
- i) Perform Installation of LAN and troubleshooting of frequently occurred problems.
- j) Create and test wireless sensor networks using zigbee.
- k) To study various aspects of data communication by field visit at data centre.
- l) Perform data communication using IR.

Reference Book:

- a) Data Communication and Networking by Behrouz A. Forouzan, 4th edition (Mc Graw Hill)
- b) Computer Networks by Andrew S. Tanenbaum, 4th edition (Pearson Publication)
- c) Data and Computer Communication by William Stallings, 8th edition (PHI Publication).

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of

students in the laboratory and class -room.

- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

- a) <http://nptel.ac.in/courses/106105082/>
- b) <http://www.networkworld.com/blogs>
- c) <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-02-introduction-to-eecs-ii-digital-communication-systems-fall-2012/index.htm#>
- d) <http://nptel.ac.in/courses/117102059/>
- e) http://www.iitk.ac.in/karmaa/DownloadTools/MCIT_DataCompressionProject/Data_Compression_Techniques_for_E-Learning.html