Banasthali Vidyapith - Department of Computer Science
Course Handout: B. Tech. (CS/IT) V Semester, July-December 2024

Date: 05-07-2024

Course Code: CS 302 **Course Name: Data Communication and Networks**
Credit Points: 4 **Max. Marks: 100 (CA: 40 + ESA: 60)**

Course Instructors: Prof. C. K. Jha, Head, Dept. of Computer Science - B.Tech. (CS-C)
Dr. Anoop Kumar, Assistant Professor, Dept. of Computer Science - B.Tech. (IT)
Mr. Sushil Buriya, Assistant Professor, Dept. of Computer Science - B.Tech. (CS-A&B)

Learning Outcomes:

On successful completion of the course students will be able to:

- Understand basics of computer networks and the data communications system & its components.
- Describe the layers of the OSI model and TCP/IP and the function(s) of each layer.
- Describe the importance of data communications and the Internet in supporting business communications and daily activity.
- Analyze the features and working of IPv4, IPv6 and their transition with Connection less and Connection oriented Transport layer protocols (TCP/UDP).
- Analyze the features and operations of various protocols such as HTTP, DNS, SMTP and many more application layer protocols.

Syllabus:

Section A

Data Communication Model, tasks of a communication system, computer network, historical background of computer networks, analog and digital transmission, transmission media, signal encoding techniques: digital data digital signals, digital data analog signals (ASK, PSK, FSK), analog data digital signals (PCM, Delta modulation), analog data analog signals (AM, FM, PM), multiplexing (TDM, WDM, FDM).

Section B

Principles and Purpose of layered approach, OSI model, TCP\IP protocol suite, Data link control: framing & synchronization, Error detection & Error correction techniques, Flow control & Error Control protocols (stop and wait, sliding window, go-back-N, selective repeat), MAC layer (CSMA/CD, CSMA/CA), Network switching techniques, Internetworking: various internetworking devices, Routing (unicast routing).

Section C

Internet Protocols (IPv4, IPv6), IP addressing (classless, classful, IPv6). Transport protocols: TCP, UDP, SCTP; Application layer protocols: DNS, FTP, E-mail, HTTP; Network security: overview of cryptography, RSA algorithm, firewalls.

Suggested Books:

R1. Stallings, W. (2007). *Data and computer communications*. Pearson Education India.
R2. Forouzan, A. B. (2007). *Data communications & networking*. Tata McGraw-Hill Education.
R3. Tanenbaum, A. S. (2014). *Computer networks*. PHI.
R4. Kurose, J. F., & Ross, K. W. (2009). *Computer networking: a top-down approach*. Pearson Education.
R5. Gupta, P. C. (2013). *Data communications and computer networks*. PHI Learning Pvt. Ltd.
R6. Couch, I. I., & Leon, W. (1998). *Modern Communication Systems: Principles and Applications.* PHI Learning.

Suggested E-Learning Materials:

E1. Computer Networking: A Top-Down Approach by James F. Kurose and Keith W. Ross
https://www.bau.edu.jo/UserPortal/UserProfile/PostsAttach/10617_1870_1.pdf
E2. Data Communication
https://nptel.ac.in/courses/106105082/

Assessment Schedule:

Component	Marks	Submission/ Examination date	Allotment/Syllabus
Assignment 1 **	10	23 August, 2024	Topics shall be allotted in the class by 07 August, 2024
Periodical Test 1	10	04-07 September, 2024*	Lecture No. 01 to 23
Assignment 2 **	10	30 September, 2024	Topics shall be allotted in the class by 14 September, 2024
Periodical Test 2	10	23-26 October, 2024*	Lecture No. 24 to 44
End-Semester Examination	60	07-24 December, 2024*	Entire Syllabus

*Subject to change.
**Assignment marks will be based on written documents, viva-voce or any other components decided by the instructors on regular basis.

Lecture Plan:

Lecture Number	Topics to be Covered	Suggested Readings
Section -A		
1-2	Data Communication Model, tasks of a communication system, computer network, historical background of computer networks	R1/R2/R5
3-6	Analog and digital transmission, transmission media	R2/R3/R5
7-10	Signal encoding techniques: digital data digital signals, digital data analog signals (ASK, PSK, FSK)	R2/R5
11-14	Analog data digital signals (PCM, Delta modulation), analog data analog signals (AM, FM, PM)	R2/R5
15-16	Multiplexing (TDM, WDM, FDM)	R2/R5
Section -B		
17-19	Principles and Purpose of layered approach, OSI model, TCP\IP protocol suite	R2/R5
20-23	Data link control: framing & synchronization, Error detection & Error correction techniques	R1/R2/R3/R5
24-26	Flow control & Error Control protocols (stop and wait, sliding window, go-back-N, selective repeat)	R1/R2/R3/R5
27-29	MAC layer (CSMA/CD, CSMA/CA)	R2/R3
30-31	Network switching techniques, Internetworking: various internetworking devices	R1/R2/R3/R5
32-34	Routing (unicast routing)	R2/R3/R6
Section -C		
35-37	Internet Protocols (IPv4, IPv6) Format, Transition IPV4 to IPV6	R2/R4
38-42	IP addressing (classless, classful, IPv6)	R2/R3/R4
43-44	Transport protocols: TCP, UDP, SCTP	R2/R3/R5
45-47	Application layer protocols: DNS, FTP, E-mail, HTTP	R2/R5
48-50	Network security: overview of cryptography, RSA algorithm, firewalls.	R2/R5

(Mr. Sushil Buriya) (Dr. Anoop Kumar) (Prof. C. K. Jha)