BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus
AUGS/ AGSR Division

SECOND SEMESTER 2020-21
COURSE HANDOUT

Date: 16.01.2021

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

Course No : **EEE F346**
Course Title : **Data Communications and Networks**
Instructor-in-Charge : **HARSHAVARDHAN S**
Instructor(s) :
Tutorial/Practical Instructors:

1. Course Description: Communication Concepts; Data and Voice Communications; Hardware Systems and Configurations; Network Topologies and Design Aspects; Protocols; Networking Local Area Networks; Network Security and Management; Emerging Trends in Communications.

2. Scope and Objective of the Course: A communication network is one of the fastest growing areas today. The course introduces the concepts and mechanisms underlying the modern telecommunication systems and networks. The course is designed in such a way that the course is accessible to students without any special technical background in this area. The OSI model is used as a framework to introduce different protocols and standards. The course will prepare the student for advanced courses in the areas: telecommunication switching systems, computer networks, and internetworking etc.

3. Text Books:
Behrouz A. Forouzan, Introduction to Data Communications and Networking, 5th Edition, McGraw-Hill Publishing Company Ltd., New Delhi, 2013.

4. Reference Books:

I. William Stallings, Data and Computer Communications, Seventh Edition, Pearson Education, Delhi.

II. Kurose and Ross, Computer networking: A Top-Down Approach, 6th Edition, Pearson Education.

III. Bertsekas and Gallager, Data networks, 2nd Edition, Pearson Education, Delhi.

IV. Alberto Leon-Gracia, Indra Widjaja, Communication Networks: Fundamental Concepts and Key Architectures, Second Edition, Tata-McGraw Hill, 2004.

5. Course Plan:

Module No	Topic	Reference	Learning Outcomes
1	Data Communications - Components, Data Representation, Data Flow	1.1	To introduce the basic protocols and standards used in networks. To get the overall idea of network models and internet history.
2	Network Criteria, Physical Structures, Network Models, Categories of Networks, The Internet	1.2, 1.3	
3	Protocols, Standards, Standard Organizations & Internet Standards	1.4	

4-7	Layered Tasks, The OSI model, Functions of Physical layer	2.1, 2.2, 2.3	To describe the functions of different network models (OSI and TCP).
	Functions of Data link layer and Network layer	2.3	
	Functions of Transport, Session and Presentation layer	2.3	
	Function of Application layer, TCP/IP Protocol Suite	2.3, 2.4	
8-9	Signal forms and their characteristics.	3.1, 3.2, 3.3	To learn the different forms of signals and their characteristics.
	Transmission Impairment, Data Rate limits, Performance	3.4, 3.5, 3.6	
10-13	Line Coding, Pulse code modulation, Delta modulation, Transmission modes	4.1, 4.2, 4.3	To learn the digital transmission and analog to digital conversion
14-16	Need of multiplexing, Classification of FDM, WDM, Synchronous TDM	6.1	To learn different multiplexing and spread spectrum techniques
	Statistical TDM, Spread Spectrum, Transmission media	6.1, 6.2, Ch-7	
17	Structure of Switch, Switched network classification	8.1, 8.2, 8.3, 8.4	To learn the different, switched network classification.
18-20	Types of error, Block coding	10.1, 10.2	To learn different error detection techniques in the received data.
	Linear block codes	10.3	
	Cyclic codes, Checksum	10 .4, 10.5	
21-22	Framing, Flow Control and Error Control, Protocols, Noise less channels	11.1,11.2,11.3, 11.4	To learn the protocols for data link control.
	Noisy channels, HDLC	11.5, 11.6	
23-24	Random access, Controlled access, Channelization	12.1,12.2, 12.3	To learn different types of multiple access techniques.
25-26	Project 802, Standard Ethernet	13.1, 13.2	To analyze the working of Ethernet (Wired LAN) and different speeds in Ethernet
	Changes in the standard, Fast Ethernet, Gigabit Ethernet	13.3, 13.4, 13.5	
27-29	IEEE 802.11(Wireless Ethernet)	14.1	To learn and understand the different wireless (IEEE 802.1 and Bluetooth) LAN techniques.
	Bluetooth (Complex technology For Small wireless LAN)	14.2	
30-31	Architecture, SONET layers, SONET frames	17.1, 17.2, 17.3	To understand SONET and multiplexing through SONET.
	STS multiplexing, SONET networks, Virtual tributaries	17.4, 17.5,17.6	

32	Basic Concept of Frame Relay and ATM	Ch-18	To understand the frame relay and ATM
33-34	Need of network layer, IPv4 addresses, IPv6 addresses	19.1, 19.2	To explain the logical addressing in the network layer
35-36	Process to process delivery, UDP, TCP	23.1, 23.2, 23.3	To learn different process in transport layer
37-38	Name space, Domain Name Space, Distribution of Name Space	25.1, 25.2, 25.3	To learn the different application layer protocols.
	Remote login, Electronic Mail and File Transfer, HTTP, WWW	Ch-26	
39-40	Digitization of audio and video, and their compression	29.1, 29.2	To explain the different Multimedia transmission in communication networks
	Voice Over IP	29.8	
41	Basics of cryptography and its application for Message Security and User Authentication	Ch-30, Ch-31	To understand the cryptography and its applications. To learn the security protocols in internet.
42	Security in different layers of Internet. Recent advancements in networking	Ch-32	

6. Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of component (Close Book/ Open Book)
Mid-Semester Test	90 Min.	30	<TEST_1>	Close Book/Open Book
Comprehensive Examination	2 h	40	<TEST_C>	Close Book/Open Book
Quiz	-	15	Spread across semester	Close Book/Open Book
Assignment	-	15	Will be announced	Open Book

7. Chamber Consultation Hour: To be announced by the Instructor-in-charge.

8. Notices: Notices concerning this course will be displayed on nalanda.bits-pilani.ac.in.

9. Make-up Policy: Make-up would be granted only for genuine cases with **prior permission**

Instructor-in-charge
Course No. BITS F346