B. V. Patel Institute of Computer Application, Uka Tarsadia University

BCA 4th Semester

Course : 030010412 - DSE5 Introduction to Computer Networks (Th)

Objective: To provide thorough understanding of Computer Network Concepts, knowledge of Physical and Data Link Layer functionalities and LAN - WAN concepts.

Course Outcomes: Upon completion of the course, students shall be able to

CO1: Summarize Data Communication, Network architecture, Protocols and Standards.

CO2: Describe the functionalities of Network Topologies and Network Components.

CO3: Recognize Data Transmission Techniques and Transmission Media.

CO4: Demonstrate Error Detection and Error Correction Methods.

CO5: Illustrate the functionalities of Data Link Layer Protocols and Medium Access Control Sublayer Protocols for Flow Control and Error Control.

CO6: Discuss and compare the functionalities of Ethernet Standards 802.3

CO7: Summarize Wide Area Network and Wireless LAN.

Sub Unit	No. of Lecture (s)	Topics	Reference Chapter/ Additional Reading	Teaching Methodology to be used	Active Learning Activities	Evaluation parameter
1. Introduction to Data Communication, Networks and Standards						
1.1	1	Data Communication, Communication systems, Applications		Chalk and Talk		Quiz
1.2	1	Network Topologies and Categories of Networks: LAN, MAN, WAN		Chalk and Talk	**For All:** Comparative study of Network Topologies and types of Network. **For Advance Learner:** Provide a various scenario to the students and from the same they shall identify network type and topology.	
1.3	2	Network Hardware: Network Interface Card, Repeater, Hub, Bridge, Router, Brouter, Switches, Gateways	(BS)#1-Page No.11-13 (AT)#1-Page No.14- 26 (BF)#1-Page No.13- 16	Topic Slides	**For All:** Comparative Study of Networking device	
1.4	2	Network Architecture, Open Systems and OSI Model: Layers of OSI model, Functionalities of each layers	(BS)#1-Page No.17-21 (AT)#1-Page No.37- 41 (BF)#1-Page No.27- 42	Demonstration, Topic Slides, Video Presentation	**For slow learners:**Ask the student to write description of topic delivered in the class. **For All:**To link 1.2, 1.3 & 1.5 with each layer and prepare chart/table of OSI layers including all topics.	
1.5	1	Protocols, Standards and Standard Organizations	(BS)#1-Page No.13-17 (AT)#1-Page No.71- 76 (BF)#1-Page No.19- 21	Topic Slides		
2. Data Transmission and Communication Media						
2.1	1	Analog and Digital Data Transmission: Analog and Digital signals	(BS)#2-Page No.36-40 (AT)#2-Page No.86- 89 (BF)#3-Page No.57- 85	Chalk and Talk, Topic Slides, Book	**For Slow &Average Learners:**To solve calculation question(s) based on terminologies	

				Reading	given in Text Book (BF).	
2.2	1	Modulation and Demodulation: Analog to Digital Conversion and Digital to Analog Conversion	(BS)#2-Page No.40-44	Topic Slides		
2.3	2	Transmission Media: Twisted Pair, Coaxial cable, Optical Fibre	(BS)#2-Page No.44-49 (AT)#2-Page No.91- 100 (BF)#7-Page No.191-203	Audio-Video, Topic Slides, Chalk and Talk, Topic Slides	**For Active Learners:** Team of three students will give presentation on given topic. Topic shall be assigned to the student one week before the presentation. **For Slow & Average Learners:** Open Book Study: Students have to explain topic given by subject teacher after reading from book. For this enough time will be given to students for the preparation.	Unit Test-1
2.4	2	Wireless Communication: Radio Waves, Microwaves, Infrared	(BS)#2-Page No.49-53 (AT)#2-Page No.100-107 (BF)#7-Page No.203-208			
2.5	1	Data Transmission: Parallel, Serial Transmission	(BS)#2-Page No.53-56 (BF)#4-Page No.131-135	Chalk and Talk, Topic Slides	**For All: Game**- The Question Answer Game playing between the four team (team shall be equally divided by the teacher) and give writing practice to each team except winner team.	
2.6	1	Interfacing, Multiplexing : FDM,TDM and WDM	(BS)#2-Page No.56-59 (BS)#2-Page No.59- 62 (BF)#6-Page No.161-170	Chalk and Talk, Topic Slides		
2.7	2	Switching: Circuit, Message and Packet	(BF)#8-Page No.208-229	Chalk and Talk, Topic Slides		
3. Error Detection and Correction						
3.1	1	Types of Error, Redundancy, Detection Versus Correction, Forward Error Correction Versus Retransmission	(BS)#3-Page No.64-65 (AT)#3-Page No.192-196 (BF)#10-Page No.267-271	Chalk and Talk, Topic Slides	**For Active Learners:** Ask the students to make programs on error correction and detection methods in any programming language so that they can have clear idea of the concepts. **For Average & Slow Learners:** Ask the students to solve extra practice questions based on given topic provided by the subject teacher.	Unit Test-1
3.2	3	Error Detection Methods: Parity Check, Cyclic Redundancy Check, Checksum	(BS)#3-Page No.65-72 (AT)#3-Page No.196-200 (BF)#10-Page No.277-280,284-301	Chalk and Talk, Hands-On		Unit Test-2
3.3	3	Error Correction: Hamming code	(BS)#3-Page No.72-76 (AT)#3-Page No.191-195 (BF)#10-Page No.280-284	Chalk and Talk, Hands-On		
4. Data Link Control and Protocol						
4.1	2	Types of Framing : Fixed-Size Framing, Variable-Size Framing	(BF)#11- Page 294 – 296	Chalk and Talk, Topic Slides, Group Discussion	**For All:** Group Discussion on Framing, Flow control and Error Control Functions of Data Link Layer. One member from each group concludes the topic(s) in 2 minutes and each member(s) of group shall write given topic(s)	Unit Test-2
4.2	2	Data Link Control Functions: Flow Control and Error Control	(BS)#5-Page No.88 (AT)#3-Page No.204-208 (BF)#11-Page No.315-317			
4.3	2	Flow Control Protocols : Stop- and- Wait, Sliding Window	(BS) #5- Page No. 89	Chalk and Talk, Topic Slides		

4.4	2	Error Control Protocols : Stop- and- Wait ARQ, Go-Back-N ARQ, Selective Reject ARQ, Piggybacking	(BS)#5-Page No.91-96 (AT)#3-Page No.208-228 v(BF)#11-Page No.3189-280,284-339	Audio-Visual, Chalk and Talk, Topic Slides	in detail.	
5. Medium Access Control SubLayer						
5.1	1	The Channel Allocation Problem	(BS)#6-Page No.110-119 (BF)#13-Page No.445-455	Topic Slides, Book Reading		Unit Test-2
5.2	3	Multiple Access Protocols: ALOHA, CSMA, CSMA/CD, CSMA/CA	(BS)#6-Page No.120-122,125-126 (AT)#4-Page No.255-258 (BF)#12-Page No. 370-376	Audio-Visual, Chalk and Talk		
5.3	3	Token Bus, Token Ring, FDDI, DQDB, LAN Operating System and Protocols	(BS)#6-Page No.126-132	Chalk and Talk, Topic Slides	**For Slow& Average Learners:** Team of three students will give presentation on given topic. Topic shall be assigned to the student one week before the presentation.	Internal
5.4	2	Ethernet: IEEE Standard and Comparison of Ethernet Technologies	(BS)#6-Page No.132-135 (AT)#4-Page No.271-275,283-289 (BF)#13-Page No. 402-416	Chalk and Talk, Topic Slides		
6. Wide Area Network and Wireless LAN's						
6.1	2	WAN, Transmission Methods: Time Division Multiple Access, Frequency Division Multiple Access, Statistical Multiple Access.	(BS)#7-Page No.137-142 (BF)#13-Page No. 383-385	Topic Slides	**For slow learners:**Think-Pair–Share question to the students and ask them to think about it and then students form pairs in which they discuss their respective ideas and then invite students to share the result of pair thinking.	Internal
6.2	2	WAN Carrier Types : Point to Point , T-carrier, SONET, ISDN, Wireless	(BS)#7-Page No.142-146	Chalk and Talk, Topic Slides		
6.3	1	Wireless LAN, Configuration and Technology	(BS)#7-Page No.177-185	Chalk and Talk, Topic Slides	**For All:**To provide case study on given topic.	
6.4	1	Wireless LAN Applications	(BS)#7-Page No.185-186	Chalk and Talk, Topic Slides		

For slow learners:Write answer of questions given by teacher after completion of each unit.

Course objectives and Course outcomes mapping:

- To provide knowledge of Computer Networks Concepts:CO1.
- To provide Knowledge of Physical and Data Link Layer functionalities: CO1, CO2, CO3,CO4, CO5, CO6
- To explore LAN-WAN Concepts: CO1, CO2, CO7.

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Course units and Course outcomes mapping:

Unit No.	Unit	Course outcome						
		CO1	CO2	CO3	CO4	CO5	CO6	CO7
1	Introduction to Data Communication, Networks and Standards	✓	✓					
2	Data Transmission and CommunicationMedia	✓		✓				
3	Error Detection and Correction	✓			✓			
4	Data Link Control and Protocols	✓				✓		
5	Medium Access Control Sublayer	✓				✓	✓	
6	Wide Area Network & Wireless LAN's	✓						✓

Programme Outcomes:

PO1: Ability to understand the concepts of key areas in computer science.
PO2: Ability to design and develop system, component or process as well as test and maintain it so as to provide promising solutions to industry and society.
PO3: Effective communication and presentation skill.
PO4: Ability to understand professional and ethical responsibility.
PO5: Recognition of the need for life-long learning.

Course Outcomes and Program Outcome Mapping:

Course Outcomes	Program Outcome				
	PO1	PO2	PO3	PO4	PO5
CO1	✓		✓		✓
CO2	✓		✓		✓
CO3	✓		✓		
CO4	✓	✓			
CO5	✓	✓			
CO6	✓				
CO7	✓		✓		

Concept Linkage:

Unit/Sub-Unit	Prior concept linkage	Post concept linkage
1:Introduction to Data Communication, Networks and Standards 2: Data Transmission and Communication Media	060060113: CC3: Computer Fundamentals and Organization: Unit 1	Internet of ThingsConcept
1. Introduction to Data Communication, Networks and Standards	060060206-CC4 Object Oriented Programming	060060408: DSE4 Multi-paradigm Programming Unit 5: Protocols and Mail Server Unit 6: Socket Programming 060060506: CC12 Introduction to Server-side Programming Specially Unit 3: HTTP Headers and Status Codes 060060508: DSE6 Fundamentals of

		Web Application Unit 5: Website Security 060060606: SEC1 Fundamentals of Cyber Security