GLS UNIVERSITY
Bachelor of Computer Applications (BCA)
(Core Course)
Semester-IV
0301404 DATA COMMUNICATION & NETWORKS

1. Course Objective:
- To become familiar with the fundamentals of data communication and networking.
- To get insights into different advanced network technologies that can be used to connect different networks.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Understand how errors detected and corrected that occur in transmission, Identify the different types of network devices and their functions within a network
- Familiarize the students with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking and mobile communication.
- Introduce students to working of Mobile networking and Wireless Sensor Network.

2. Course Duration:
The course will have sessions which are divided into five modules. Each module consists of nine sessions of 60 minutes each and carries a weightage of 20%.

3. Course Contents:

Module No.	Modules/Sub-Modules	No. of Sessions	Marks Weightage
I	**Introduction to Data communications and Networking**	09	20%
	• Introduction of Data communication		
	• Characteristics of Data communication		
	• Protocols		
	• Standards		
	• Analog and digital signals		
	• Bandwidth, Amplitude, Phase, Period and Frequency of a signal		
	• Baud Rate and Bits per second		
	Analog and Digital transmission Method		
	• Introduction		
	• Analog signal, Analog transmission		
	• Digital signal, Digital transmission (ASK, FSK, PSK)		
	• Digital signal, Analog transmission		

	• Analog signal, Digital transmission (PCM)
	Modes of data transmission
	• Introduction
	• Parallel and Serial communication
	• Synchronous, Synchronous communication
	• Simplex, half duplex and full-duplex communication
	Networks
	• Types of Network
	   o LAN
	   o MAN
	   o WAN
	   o VLAN		

II	**Multiplexing and De-multiplexing**
	• Concept of Multiplexing and De-multiplexing
	• Types of Multiplexing
	   o FDM
	   o TDM
	   o WDM
	• FDM versus TDM
	Transmission Errors: Detection and correction
	• Introduction
	• Error classification
	   o Delay Distortion
	   o Attenuation
	   o Noise
	• Types of Error
	• Error Detection
	   o Checksum
	   o VRC
	   o LRC
	   o CRC
	• Recovery from errors
	   o Stop and Wait
	   o Go back n
	   o Sliding Window
		09	20%

III	**Transmission Media**
	• Guided media
	   o Twisted pair
	   o Coaxial cable
	   o Optical fiber
	• Unguided media
	   o Microwave
		09	20%

	o Satellite communication			
	o Cellular telephones			
	Network Topologies			
	• Bus Topology			
	• Star Topology			
	• Ring Topology			
	• Mesh Topology			
	o Full Mesh			
	o Partial Mesh			
	• Tree Topology			
	• Hybrid Topology			
	FDDI			
	• Introduction			
	• Properties and Operation			
	• Self-healing Mechanism			
	Switching			
	• Circuit Switching			
	• Message Switching			
	• Packet Switching			
IV	**OSI Model and TCP/IP**	09	20%	
	IP Addrssing			
	• Why IP Addresses?			
	• Classes of IP Addresses			
	• IPV6 vs IPV4			
	• Introduction to CIDR			
	• Domain Name System (Overview)			
	OSI Model			
	• Introduction			
	• Functionality of OSI Layer			
	TCP/IP			
	• Introduction and its basic			
	• Layers and its Protocols			
	o Application Layer			
	▪ Telnet, SMTP, FTP, HTTP, TFTP, IP-RTP			
	o Transport Layer			
	▪ TCP, UDP			
	o Network Layer			
	▪ ICMP, IP, ARP, RARP			
	o Data Link Layer			
	o Physical Layer			
	IEEE Standards(Overview)			
	• IEEE 802.1			

	• IEEE 802.3 • IEEE 802.11 • IEEE 802.15 **CSMA/CD**			
V	**Internet working devices** • Repeater • Bridges • Routers • Gateway • Switch **Introduction to Mobile Communication and Computing** • Mobile Computing • Mobile Computing vs. Wireless Networking • Wired Networks vs. Mobile Networks • Mobile Computing Applications • Characteristics of Mobile Computing • Structure of Mobile Computing **Wireless Sensor Network** • Introduction to WSN • Architecture of WSN • WSN vs MANET • Characteristics of WSN • Design Challenges • Advantages and Disadvantages of WSN • WSN with IOT(Overview)		09	20%

4. Teaching Methods:
The following pedagogical tools will be used to teach this course:
1. Laboratory sessions
2. E-learning
3. Assignments and Presentations

5. Evaluation:
The students will be evaluated on a continuous basis and broadly follow the scheme given below:

1.	Assignments / Presentations / Quizzes / Class Participation, etc.	30% (Internal Assessment)
2.	Internal Examination	20% (Internal Assessment)
3.	External Examination	50% (External Assessment)

6. Basic Text Books:

Sr. No	Author/s	Name of the book	Publisher	Edition
T1	Achyut S Godbole	Data Communication and Computer Networks	Tata McGraw-Hill Companies	2nd Edition
T2	ISRD Group	Data Communication and Computer Networks	-	Latest

7. Reference Books:

Sr. No	Author/s	Name of the book	Publisher	Edition
R1	Wayne Tomasi	Introduction to Data communications and Networking	Pearson	Latest
R2	Youlu Zheng and Shakil Akhtar	Networks for computer Scientists and Engineering	Oxford	Latest
R3	Achyut Godbole and Atul Kahate	Data Communications and Networks	Tata McGraw Hill Education Private Limited	2nd Edition
R4	Behrouz A. Fourouzan	Data Communication and Networking	Tata McGraw Hill Education Private Limited	3rd Edition

8. Reference Links:

Sr. No	Links
1	http://nptel.ac.in/courses/106105082/
2	http://www.tutorialspoint.com/data_communication_computer_network
3	https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==

9. Session Plan:

Session No.	Topics / Chapters
1-3	Introduction of Data communication, Characteristics of Data communication, Protocols, Standards, Introduce the data signals, Bandwidth, Amplitude, Phase, Period and Frequency of a signal, Baud Rate and Bits per second, Introduction to modes of data transmission, Parallel and Serial communication, Synchronous, Synchronous communication, Simplex, half duplex and full-duplex communication
4-8	Introduction to Analog and Digital transmission Method, Analog signal, Analog transmission, Digital signal, Digital transmission (ASK, FSK, PSK),Digital signal, Analog transmission, Analog signal, Digital transmission (PCM)
9	Types of Networks – LAN , MAN , WAN , VLAN
10-12	Introduction of Multiplexing and De-multiplexing, Types of Multiplexing

13-15	Transmission Errors detection and correction, Error classification definition, Types of Errors and Errors Detection by different methods.
16-18	Recovery from errors by different methods like Stop and Wait, Go-n-back, Sliding Window
19-21	Types of Transmission Media:- Guided media Types:- Twisted pair, Coaxial cable, Optical fiber
22-25	Unguided media Type:- Microwave, Satellite communication, Cellular telephones, Introduction to Network Topologies, Types of Network Topology
26-27	Introduction and working of FDDI, Concepts of Switching
28-32	IP Addressing , OSI Model introduction and functionalities
33-34	TCP/IP Layers and its Protocols
35-36	IEEE Standards and CSMA/CD
37-39	Internetworking devices , Introduction to Mobile Communication and Computing
40-45	Introduction to Wireless Sensor Network

10. Learning Outcomes:

Upon the completion of this course, students will be able to:

- Learns the basic concepts of data communication including key aspects of networking, packet switching, circuit switching and message switching.
- Compare and contrast LAN and WAN.
- The role of protocols in networking. Analyze the features of the various layers of data networks.
- Understand the logic of error detection and correction methods of data communication.
- Learn types of communication medium.
- Learn working of mobile network and Wireless sensor network.