GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Computer Applications

Level: Under Graduate

Course / Subject Code: BC03001031

Course / Subject Name: Computer Networking

w. e. f. Academic Year:	2025-26
Semester:	3
Category of the Course:	Core Courses

Prerequisite:	Basic Concept of Data Structures, Operating systems, Programming Language and Knowledge of Linux OS.
Rationale:	• The subject intends to introduce the concept of information exchange across the network. • Students will learn the base concepts of layering approach for the communication through the OSI and TCP/IP models. • Students will learn the dedicated functionality of every layer, which is required to perform specific tasks for the communication. • Students will gain basic insight of programming for the network solutions.

Course Outcome:

After Completion of the Course, students will be able to:

No.	Course Outcomes	RBT Level*
1	Explain the basic concepts and architecture of computer networks, including network topologies, models (OSI and TCP/IP), and types of networks.	UN
2	Discuss various components required to build different types of wired and wireless networks.	UN
3	Describe the role and responsibilities of the Data Link Layer in the OSI model, including framing, addressing, and error detection. Compare different MAC protocols in terms of efficiency and collision handling.	AP
4	Design network architecture, assign IP addressing and apply various routing algorithms to find shortest paths for network-layer packet delivery. Evaluate error control and flow control at transport layer.	CR
5	Understand and evaluate application layer protocols DNS, HTTP and WWW.	AN

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	**Introduction:** Use of Computer Network, Types of Computer Networks, Personal Area Network, Local Area Network, Metropolitan Area Network, Wide Area Network, Internetworks, ARPANET, NSFNET, The Internet Architecture, Protocol Layering, Connection-Oriented Service, Connectionless Service, Service Primitives, Relationship of Services to Protocols, OSI Reference Model, TCP/IP Reference Model	5	10
2	**Physical Layer:** Guided Transmission Media, Persistent Storage, Twisted Pairs, Coaxial Cable, Fiber Optics, Wireless Transmission, The Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission, Light Transmission, Digital Modulation, Multiplexing, Public Switched Telephone Network, Switching	7	15
3	**Data Link Layer:** Data Link Layer Design Issues, Error Detection and Correction, Simplex Link Layer Protocols: Utopia, Stop-and-Wait, Sequence Number and ARQ, Piggybacking, Sliding Windows, One-bit Sliding Window, Go-Back-N, Selective Repeat **Medium Access Control Sub Layer:** Channel Allocation Problem, ALOHA, Carrier Sense Multiple Access Protocols, Collision Free Protocols, Wireless LAN Protocol, IEEE 802.11 Architecture and Protocol Stack, 802.11 Physical Layer, 802.11 MAC Sublayer Protocol, 802.11 Frame Structure, Bluetooth Architecture	13	30
4	**Network Layer:** Network Layer Design Issues, Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Need for Traffic Management, Traffic Aware Routing, Admission Control, Load Shedding, Random Early Detection, Choke Packets, Explicit Congestion Notification, IPv4 Classfull Addressing **Transport Layer:** Transport Service, Services Provided to the Upper Layers, Transport Service Primitives, Elements of Transport Protocols, Transport Layer	13	30

	Addressing, Connection Establishment, Connection Release, Congestion Control, UDP, TCP		
5	**Application Layer:** Domain Name System (DNS), Electronic Mail, World Wide Web	7	15
	Total Hours:	**45**	**100%**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	30	20	10	10	10

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

Textbook:

1. Computer Networks, By: Andrew S Tanenbaum, Nick Feamster, David Wethrall, 6th Edition, Pearson Education India, ISBN: 978-1-292-37406-2

Reference Books:

1. Data Communications and Networking, By: Behrouz A. Forouzan, 5th Edition, Mc Graw Hill Publication, ISBN: 978-0-07-337622-6
2. Computer Networking A Top-Down Approach, By: James F. Kurose, Keith W. Ross, 8th Edition, Pearson Publication, ISBN: 978-1-292-40546-9
3. Computer Networks, By: Bhushan Trivedi, Oxford Publication, ISBN: 978-0198066774

List of Useful websites / MOOCs

1. Learners are advised to opt for NPTEL and SWAYAM courses that are relevant to this course

Suggested Course Practical List:

1	Make the students aware about the IT/Network infrastructure of their parent institute.
2	Study the basic network commands and Network configuration commands.
3	Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.
4	Performing an Initial Switch Configuration.
5	Performing an Initial Router Configuration.
6	Configuring and Troubleshooting a Switched Network.
7	Connecting a Switch.

8	Configuring WEP on a Wireless Router.
9	Interpreting Ping and Traceroute Output.
10	Configuring a Cisco Router as a DHCP Server.
11	Installation and introduction of simulation tools packet tracer/GNS3.
12	Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
13	Install and configure a network interface card in a workstation.
14	Managing user accounts in windows and LINUX.
15	Sharing of Hardware resources in the network.
16	Use of Netstat and its options.
17	Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG.
18	Installation of Network Operating System (NOS).
19	Visit nearby industries for the latest networking techniques.
20	Create a network of at least 6 computers.
21	Study and use of wireshark to capture and analyze the network traffic.

CO- PO Mapping:

Semester : 3	**Course Name : Computer Networking**										
	POs										
Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	3	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	1	-	-	-	-	-	-	-
CO3	3	3	2	1	1	-	-	-	-	-	-
CO4	3	3	2	2	2	2	-	-	-	-	-
CO5	3	3	2	1	3	-	-	1	-	-	-

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

Note: The CO-PO mapping is indicative; the institute/faculty member can change as required.

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