

FACULTY OF COMPUTER APPLICATIONS
Bachelor of Science (Information Technology)
B.Sc. (IT)

- **Sem.** : 4
- **Subject Code** : 05BS0403
- **Subject** : Computer Networks
- **Course Objectives** :
 1. To understand the fundamental concepts of networking.
 2. To understand the functionality of each layer of OSI and TCP/IP models and interactions between them.
 3. To understand deeply the work of each layer of TCP/IP model.
 4. To study different techniques for framing, error control, flow control and routing.
 5. To develop an understanding of modern network architectures from a design and performance perspective
- **Prerequisites** : Basics of computer and os.

Unit No	Topics Covered	No of lectures required
1	Introduction Introduction of computer network, uses of computer network, Data communication components, Data Flow communication, Network Criteria, Types of network connections, Network Topologies, Categories of Networks, Protocol Hierarchies, Connection-Oriented Versus Connectionless Service, Design Issues for the Layers, Network Models: OSI and TCP/IP.	10
2	Physical Layer Analog and Digital signals, Duties of Physical Layer, Transmission media: Guided and Unguided media. Introduction of Modulation and Multiplexing.	08
3	Data Link Layer Design issues of data link layer, framing techniques, Error detection techniques: Parity Bit Checker (LRC,	12

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	VRC), Checksum, CRC, Error Correction Technique: Hamming Code, Elementary Data Link Protocols: Simplex Stop and Wait Protocols for noisy channel, Sliding Window Protocol	
4	MAC and Network Layer Channel Allocation Problem, Multiple Access Protocols, Type of Ethernet. Network Layer design issues, IPV4, IPV6.	10
5	Transport and Application Layer Duties of Transport Layers, Elements of transport protocols, TCP and UDP protocol. Domain Name System, Electronic Mail, The World Wide Web.	10

Course Outcomes :

1. Explain basics of Computer Networks and functionality of each layer of OSI and TCP/IP models.
2. Illustrate protocol layering and physical level communication.
3. Apply error control and flow control techniques to provide better security.
4. Enhance the network layer architecture with IP addressing.
5. Analyze data flow between TCP/IP model using Application, Transport and Application Layer Protocols.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L				L		L	M
CO2	M	H	M	L		L	L	L	L	H
CO3	H	H	M	L	L	M	M	L	M	M
CO4	H	H	M	L	M	H	M	L	M	H
CO5	H	M	H	M	H	H	H	H	M	H

Text Book :

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1. "Data Communications and Networking", Behrouz A. Forouzan, Tata McGraw-Hill, Fourth Edition.
2. "Computer Networks", Andrew S. Tanenbaum, Prentice Hall, Fourth Edition.

Reference Books :

1. Computer Networking, James F. Kurose and Keith W. Ross International edition, Pearson Education 2012
2. Computer Networks – V.S. Bagad and I.A. Dhotre, Technical Publications.
3. Advanced Programming in Unix Environment, W. Richard Stevens, Pearson Education Publications, Second Edition

Web References :

1. <https://www.javatpoint.com/computer-network-tutorial>
2. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
3. <https://www.wireshark.org/>

App References :

1. Computer Networking Tutorial- Complete course IT
2. Computer Networking Dictionary

Syllabus Coverage from text /reference book & web/app reference:

Unit #	Chapter Numbers
1	Book 1: Chapter 1: 1.1, 1.2, Book 2: 1.1, 1.2, 1.3.1, 1.3.2, 1.3.3, 1.4.1, 1.4.2
2	Book 1: 3.1 Book 2: 2.2, 2.3, 2.5
3	Book 2: 3.1 to 3.4
4	Book 2: 4.1 to 4.3, 5.1, 5.6.1 to 5.6.3
5	Book 2: 6.1, 6.2, 6.4, 6.5, 7.1 to 7.3.



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PRACTICALS

Unit No	List of Practicals
1	<ol style="list-style-type: none">1. To make the students aware about the IT/Network infrastructure of their parent institute and prepare a report for the same.2. Manually analyze your device connected with Network and identify IPV4 and IPV6 Address, MAC address, DNS Address, Subnet mask address and default gateway.
2	<ol style="list-style-type: none">1. To make the students aware about and learn the detailed use of the following OSlevel TCP/IP diagnostic and troubleshooting commands: ping, ns lookup2. To make the students aware about and learn the detailed use of the following OSlevel TCP/IP diagnostic and troubleshooting commands: ipconfig, arp, netstat, tracert, telnet
3	<ol style="list-style-type: none">1. Implement a program in C which demonstrates Byte-stuffing framing technique in which sender reads a data from terminal apply byte stuffing and sends it to receiver along with original string. Receiver should display received frame data before and after de-stuffing also compare the original string of sender with de-stuffed string of receiver.2. Implement a program in C which demonstrates Bit-stuffing framing technique in which sender reads a data from terminal apply bit stuffing and sends it to receiver along with original string. Receiver should display received frame data before and after de-stuffing also compare the original string of sender with de-stuffed string of receiver.3. Implement character count framing technique in which sender will append the length of the sting and sends it to the receiver and receiver will again count the characters and compare it with the length of sender.4. Implement Error detection using single bit parity (VRC) checker.5. Implement a program in C to demonstrate the

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	working of stop and wait protocol for sender and receiver communication.
4	<ol style="list-style-type: none"> 1. Wireshark Installation, understanding the Wireshark Environment / Menu System, to start and stop live capture of traffic from given wired Ethernet network interface, capturing options, store captured data in different supported file formats, to open already stored captured data file. 2. Learn and use view level filters and capture level filters in Wireshark for different traffic types like Ethernet, ARP, IP, TCP, UDP, DNS, HTTP, etc. For each captured category observe how different headers are encapsulated within each other. 3. Capture the following traffic types and interpret/ Analyze the corresponding header and payload: IP4/6
5	<ol style="list-style-type: none"> 1. Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: TCP 2. Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: UDP 3. Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: HTTP 4. Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: DNS