CSEN2021	COMPUTER NETWORKS	L	T	P	S	J	C
		3	0	2	0	0	4
Pre-requisite	CSEN1071 (Data Communications)						
Co-requisite	Operating Systems						
Preferable exposure	**None**						

Course Description:

The course is designed to impart a basic understanding of the working of computer networks, with the Internet as the case in point. Starting with the application layer with which the user interacts directly, it covers the important principles and protocols in the application, transport, network and link layers. Brief introductions to socket programming and wireless networks are provided.

Course Educational Objectives:

- Familiarize the student with the components of the Internet and the concept of layered protocol architecture.
- Expose the student to the important principles behind the working of various layers of a network.
- Enable the student to write simple network applications using socket programming.
- Demonstrate the working of the most important protocols used in the Internet.
- Acquaint the student with the basics of wireless networking.

UNIT 1 Computer networks and the Internet 9 hours

Computer networks and the Internet: Internet, The Network Edge, The Network Core: Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and Their Service Models, History of Computer Networking and the Internet

UNIT 2 Application Layer 9 hours

Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet, DNS-The Internet's Directory Service, Socket Programming: Creating Network Applications

UNIT 3 Introduction and Transport 9 hours

Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless

Transport: UDP, Principles of Reliable Data Transfer, Connection-oriented Transport: TCP, Principles of Congestion Control: TCP Congestion Control.

UNIT 4 The Network Layer 9 hours

Introduction, Virtual Circuit and Datagram Networks, Inside Router, The Internet Protocol (IP), Routing Algorithms-The Link State (LS) Routing Algorithm, The Distance Vector (DV) Routing Algorithm, Hierarchical Routing

UNIT 5 The Link Layer, Wireless and Mobile Networks 9 hours,

Introduction to the Link Layer, Multiple Access Links and Protocols, Switched Local Area Networks. Introduction to Wireless and Mobile Networks, Wireless Links and Network Characteristics, WiFi:802.11 Wireless LANs (Architecture and MAC Protocol), Mobile IP

Laboratory

Exp no Name of the exercise Proposed no. of Lab sessions

1. Write a report that includes a diagram showing the topology, type of connection devices, and speed of the wired and wireless LAN in your organization. Also find out the MAC and IP addresses and the subnet mask of your computer. – 1

2. Install and run a network diagnosis tool such as TCP dump or Wireshark. Start capturing packets on an active interface, open a browser and type the address of your favourite search engine. Wait till the page loads and stop capture. List out the type and number of each type of packets captured. – 2

3. Write a program to create a server that listens to port 53 using stream sockets. Write a simple client program to connect to the server. Send a simple text message “Hello” from the client to the server and the server to the client and close the connection. - 2

4. Write a program to create a chat server that listens to port 54 using stream sockets. Write a simple client program to connect to the server. Send multiple text messages from the client to the server and vice versa. When either party types “Bye”, close the connection - 1

5. Write a program to create a server that listens to port 55 using stream sockets. Write a simple client program to connect to the server. The client should request for a text file and the server should return the file before terminating the connection – 1

6. Write a program to create a server that listens to port 56 using stream sockets. Write a simple client program to connect to the server. Run multiple clients that request the server for binary files. The server should service each client one after the other before terminating the connection . - 2

7. Write a program to create a server that listens to port 57 using stream sockets. Write a simple client program to connect to the server. Run multiple clients that request the server for text files. The server should service all clients concurrently. – 2

8. Write a program to create a server that listens to port 59 using datagram sockets. Write a simple client program that requests the server for a binary file. The server should service multiple clients concurrently and send the requested files in response. - 2

TextBooks:

1. James F. Kurose and Keith W. Ross, Computer Networking: A Top-Down Approach, 6/e, Pearson, 2012.

References:

1. Andrew S. Tanenbaum and David J. Wetherall, Computer Networks, 5/e, Prentice Hall, 2011
2. Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, 3/e, Morgan Kaufmann, 2011.
3. Richard Stevens, UNIX Network Programming – Volume 1, 3/e, Prentice Hall of India, 1997.
4. Afaqui, M. Shahwaiz, Eduard Garcia-Villegas, and Elena Lopez-Aguilera. "IEEE 802.11 ax: Challenges and requirements for future high efficiency WiFi." IEEE wireless communications 24, no. 3 (2016): 130-137.
5. Hiertz, Guido R., Dee Denteneer, Sebastian Max, Rakesh Taori, Javier Cardona, Lars Berlemann, and Bernhard Walke. "IEEE 802.11 s: the WLAN mesh standard." IEEE Wireless Communications 17, no. 1 (2010): 104-111.
6. https://www.coursera.org/learn/computer-networking
7. https://www.geeksforgeeks.org/basics-computer-networking/
8. https://www.netacad.com/portal/web/self-enroll/m/course-860135
9. https://www.ece.rutgers.edu/~marsic/books/CN/links/

Course Outcomes:

After successful completion of the course the student will be able to:

1. interpret the concept of modular network design using layered protocol architecture
2. list the various components in the Internet and their functions
3. analyze various types of services provided by each layer in the network architecture
4. discuss the working of the important protocols used in the Internet
5. develop simple network applications and test them

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3			1	2					1			2		
CO2		2	3							1			2	3	1
CO3	2			3		1				1		1		3	
CO4	1			2	3				1	1	1		2	1	3
CO5	2				1	3	1	1					1	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 06-09-2021 **ACADEMIC COUNCIL: 01-04-2022**

SDG No. & Statement:

SDG Justification: