22EC401 DATA COMMUNICATIONS AND COMPUTER NETWORKS

Source - https://nizamtaher.wordpress.com/topics/topic-1-introduction-of-computer-network/

Hours Per Week :

L	T	P	C
3	0	2	4

PREREQUISITE KNOWLEDGE: Communication Systems.

COURSE DESCRIPTION AND OBJECTIVES:

Students will be familiar with the components required to build different types of networks and also exposed and learn to the required functionality at each layer and the flow control and congestion control algorithms.

MODULE-1

UNIT-1 **10L+0T+6P=16 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, Networks Under Attack, History of Computer Networking and the Internet

Application Layer: Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet DNS—The Internet's Directory Service

UNIT-2 **14L+0T+10P=24 Hours**

Application Layer: Peer-to-Peer Applications, P2P File Distribution, Video Streaming and Content Distribution Networks, Socket Programming: Creating Network Applications

Transport Layer: Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer - Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N (GBN), Selective Repeat (SR), Connection-Oriented Transport: TCP - The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Principles of Congestion Control, TCP Congestion Control, Evolution of transport-layer functionality

PRACTICES:

Using Wireshark tool:

- Introduction to Wireshark Tool
- Study and analyse the Hyper Text Transfer Protocol (HTTP)
- Study and analyse the Domain Name System (DNS)
- Study and analyse the Transmission Control Protocol (TCP)
- Study and analyse the User Datagram Protocol (UDP)

MODULE –2

UNIT-1 **12L+0T+8P=20 Hours**

THE NETWORK LAYER - DATA PLANE:

Overview of Network Layer - Forwarding and Routing: The Network Data and Control Planes, What's Inside a Router? The Internet Protocol (IP): IPv4, Addressing, IPv6, and More, Generalized Forwarding and SDN

SKILLS:

- ✓ *Implement Local Area Networks with different topologies.*
- ✓ *Able to simulate various routing protocols.*
- ✓ *Able to perform Network trouble shooting.*

The Network Layer - Control Plane: Introduction, Routing Algorithms - The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Intra-AS Routing in the Internet: OSPF, Routing Among the ISPs: BGP, The SDN Control Plane -The SDN Control Plane: SDN Controller and SDN Control Applications, ICMP: The Internet Control Message Protocol

UNIT-2 **12L+0T+8P=20 Hours**

The Link Layer and LANs: Introduction to the Link Layer, Error Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request

PRACTICES:

Using Wireshark tool:

- Study and analyse the Internet Protocol (IP)
- Study and analyse the Network Address Translation (NAT)
- Study and analyse the Dynamic Host Configuration Protocol (DHCP)
- Study and analyse the Internet Control Message Protocol (ICMP)
- Study and analyse the Ethernet and ARP
- Study and analyse the 802.11 WiFi

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the basic Network types, topologies and internet protocols	Apply	1	1, 2, 4, 5, 9, 10, 12
2	Understand and analyze the mechanisms of IP addressing, routing, congestion control, domain naming, world wide web and multimedia streaming.	Apply	1	1, 2, 5, 9, 10
3	Understand and analyze the protocols that belong to various layers and open flow models for SDN	Analyse	1, 2	1, 2, 3, 5, 9, 10
4	Understand and analyze various network security mechanisms of Networks.	Analyse	1,2	1, 2, 5, 9, 10, 12
5	Implementation of various Protocols that belong to application Layer, transport Layer, network layer, and link layer	Evaluate	1, 2	1, 2, 3, 4, 5, 9, 10, 12

TEXT BOOKS:

1. James F. Kurose, Keith Ross, “Computer Networking: A Top-Down Approach”, 8th edition, Pearson Education, 2020.
2. Andrew S Tanenbaum, “Computer Networks”, 5th edition, Pearson Education, 2014.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, “Data communications and Networking”, 3rd edition, TataMcGraw Hill, 2003.
2. James F. Kurose, Keith Ross, “Computer Networking: A Top-Down Approach”, 7th edition, Pearon Education, 2017.
3. William Stallings, “Data and Computer Communications”, 9th edition, Pearson Education/ Prentice Hall, 2013.