COMPUTER NETWORKS

VIII Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT003	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Develop and understanding of modern network architectures from a design and performance perspective.
II. Understand the basics and challenges of network communication.
III. Provide an opportunity to do network programming using TCP/IP.
IV. Understand the operation of the protocols that are used inside the Internet.

COURSE OUTCOMES (COs):

CO 1: Understand the basic concepts of physical layer architectures and mediums.
CO 2: Discuss the concepts of dada link layer and error detection and controlling mechanism.
CO 3: Understand the fundamentals of Network layer design issues and network protocols.
CO 4: Analyze the elements of transport protocols and performance problems in computer networks.
CO 5: Discuss the concepts of application layer and File Transfer Protocols.

COURSE LEARNING OUTCOMES (CLOs):

1. Understand the importance of data networks and the Internet in supporting business communications and everyday activities.
2. Classify different network topologies, LANs, MANSs, WANs, internetworks and models such as Open System Interconnect (OSI), TCP/IP.
3. Understand the significance and purpose of protocols, standards and their key elements use in data communications and networking.
4. Describe the relationship between data and signals, their types, behavior, properties, characterization and transmission in the physical layer.
5. Understand the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching as internal external operations, physical structures, types, models and internetworking.
6. Understand the concept, advantages, analysis of cyclic codes including their algebraic representation and explain the design, implementation, performance of cyclic redundancy check, checksum.
7. Understand the basic difference between data logical link control, media access control and discuss logical link control with reference to framing, flow and error control.
8. Describe the reliable inter-node transmission of frames and discuss the ability to compare and contrast high-level data link control protocol and point-to-point protocol (HDLC, PPP).
9. Understand connecting LAN's, backbone networks, and virtual LAN's and operations of bridges, spanning tree algorithm in networks.
10. Explain the role of data link layer protocols in data transmission and the preparation method of data for transmission on network media.
11. Understand routing principles and algorithms such as distance vector and link state and usage of the routing protocols on the Internet such as RIP, OSPF, and BGP.
12. Understand internetworking principles and the operation of Internet protocols IP, IPv4, IPv6 and ICMP.
13. Explain and demonstrate the mechanics associated with IP addressing, device interface, association between

physical and logical addressing.

14. Understand the concepts of transport service, elements of transport protocol and congestion control in the computer networks.
15. Describe the utilization of transport layer protocols in the control congestion on the Internet.
16. Analyze the correct transport layer protocol, such as TCP and UDP to transfer data segments in the networks.
17. Describe the SCTP, RTP protocols and analyze the applications based on these protocols, network activity at the transport layer.
18. Analyze the operations and features of common application layer protocols such as Hyper Text Transfer protocol (HTTP), File transfer Protocol (FTP.)
19. Describe the operations and features of common application layer protocols such as Dynamic Host Configuration Protocol (DHCP), Simple Mail Transfer Protocol (SMTP).
20. Describe SSH-based applications, socket programming and its role in application processing.
21. Analyze the process of map hostnames to IP addresses using Domain Naming System (DNS) protocol.
22. Understand the concepts of E-mail, telnet, secure shell in computer networks.
23. Possess the knowledge and skills for employability and to succeed in national and international level competitive examinations.
24. Possess the knowledge and skills currently use in the Internet work and the requirements for designing network protocols.

Unit-I	**INTRODUCTION TO PHYSICAL LAYER**	**Classes: 09**

Introduction: Networks, network types, internet history, standards and administration; Network models: Protocol layering, TCP/IP protocol suite, the OSI model; Introduction to physical layer: Data and signals, transmission impairment, data rate limits, performance; Transmission media: Introduction, guided media, unguided media; Switching: Introduction, circuit switched networks, packet switching.

Unit-II	**INTRODUCTION TO DATA LINK LAYER**	**Classes: 08**

Introduction: Link layer addressing, error detection and correction: Cyclic codes, checksum, forward error correction: Data link control: DLC services, data link layer protocols, HDLC, point to point protocol, media access control: Random access, controlled access, channelization, connecting devices and virtual LAN: Connecting devices, virtual LAN.

Unit-III	**THE NETWORK LAYER**	**Classes: 10**

Network layer design issues, routing algorithms, congestion control algorithms, quality of service, and internetworking.

The network layer in the internet: IPv4 addresses, IPv6, internet control protocols, OSPF (Open Shortest Path First), BGP (Border Gateway Protocol), IP, (Internet Protocol), ICMP (internet control message protocol.

Unit-IV	**THE TRANSPORT LAYER**	**Classes: 09**

The transport service, elements of transport protocols, congestion control; The internet transport protocols: UDP (User Datagram Protocol), TCP (Transport Control Protocol), performance problems in computer networks, network performance measurement.

Unit-V	**INTRODUCTION TO APPLICATION LAYER**	**Classes: 09**

Introduction, client server programming, WWW (World Wide Web) and HTTP (Hyper Text Transfer Protocol), FTP (File Transfer Protocol), E-MAIL, TELNET, SECURE SHELL, DNS(Domain Naming System), SNMP (Simple Network Management Protocol).

Text Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", Tata Mcgraw hill,5th Edition, 2012.
2. Andrew S. Tanenbaum , David.j.Wetherall, "Computer Networks", Prentice-Hall, 5th Edition, 2010.

Reference Books:

1. Douglas E. Comer "Internetworking with TCP/IP ", Prentice-Hall, 5th Edition, 2011.
2. Peterson, Davie, Elsevier "Computer Networks", 5th Edition,2011
3. Comer, "Computer Networks and Internets with Internet Applications", 4th Edition, 2004.
4. Chawan- Hwa Wu, Irwin, "Introduction to Computer Networks and Cyber Security", CRC publications, 2014.

Web References:

1. http://computer.howstuffworks.com/computer-networking-channel.htm
2. http://www.ietf.org
3. http://www.rfc-editor.org/
4. https://technet.microsoft.com/en-us/network/default.aspx

E-Text Books:

1. http://www.freebookcentre.net/networking-books-download/Introduction-to-Computer-Networks. html
2. http://www.freebookcentre.net/networking-books-download/Lecture-Notes-on ComputerNetworks.html