

## COMPUTER NETWORKS

**V Semester: CSE / IT**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AITB10	Core	3	-	-	3	30	70	100
		<b>Contact Classes: 45</b>			<b>Tutorial Classes: Nil</b>		<b>Practical Classes: Nil</b>	
		<b>Total Classes: 45</b>						

### I. COURSE OVERVIEW:

The main emphasis of this course is on the organization and management of local area networks (LANs) wide area networks (WANs). The course includes learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks. Topics include layered network architectures, addressing, naming, forwarding, routing, communication reliability, the client-server model, and web and email protocols. The applications of this course are to design, implement and maintain a basic computer networks.

### II. OBJECTIVES:

**The course should enable the students to:**

- I. Develop an 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.

### III. COURSE OUTCOMES:

**After successful completion of the course, students should be able to:**

- |      |                                                                                                                                                                                                                                                                                             |            |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| CO 1 | <b>Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers, media, and devices.</b>                                                                                                                                                        | Understand |
| CO 2 | <b>Understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.</b> | Understand |
| CO 3 | <b>Illustratively explain the concept of Hamming distance, and the significance of the minimum Hamming distance and its relationship to errors as well as detection and correction of errors in block codes.</b>                                                                            | Understand |
| CO 4 | <b>Evaluate the performance of a single link, logical process-to-process (end-to-end) channel, and a network as a whole (latency, bandwidth, and throughput).</b>                                                                                                                           | Evaluate   |
| CO 5 | <b>Distinguish between the different types of bit errors and can explain the concept of bit redundancy and how it is generally achieved in the facilitation of error detection and the main methods of error correction.</b>                                                                | Analyze    |
| CO 6 | <b>Explain and demonstrate the mechanics associated with IP addressing, device interface, association between physical and logical addressing, subnetting and super netting.</b>                                                                                                            | Understand |
| CO 7 | <b>Discuss internetworking principles and how the Internet protocols IP, IPv6 and ICMP operate.</b>                                                                                                                                                                                         | Understand |
| CO 8 | <b>Understand routing principles and algorithms such as distance vector and link state.</b>                                                                                                                                                                                                 | Understand |
| CO 9 | <b>Explain the concept of reliable and unreliable transfer protocol of data and how TCP and UDP implement these concepts</b>                                                                                                                                                                | Understand |

CO 10	<b>Distinguish</b> four levels of addresses (physical, logical, port, and specific used by the Internet TCP/IP protocols.	Analyze
CO 11	<b>Understand</b> the significance, purpose of protocols (FTP, SMTP), standards and use in data communications and networking.	Understand
CO 12	<b>Describe</b> the most common DNS resource records that occur in a zone file.	Understand

#### IV. SYLLABUS:

<b>MODULE-I</b>	<b>INTRODUCTION</b>	<b>Classes: 10</b>
Introduction: Networks, network types, internet history, standards and administration; Network models: Protocol layering, TCP/IP protocol suite, the OSI model Transmission media: Introduction, guided media, unguided media; Switching: Introduction, circuit switched networks, packet switching.		
<b>MODULE-II</b>	<b>DATA LINK LAYER</b>	<b>Classes: 10</b>
Introduction: Link layer addressing; Error detection and correction: Cyclic codes, checksum, forward error correction; Data link control: DLC services, data link layer protocols, media access control: Random access, virtual LAN.		
<b>MODULE-III</b>	<b>NETWORK LAYER</b>	<b>Classes: 09</b>
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), IP (Internet Protocol)		
<b>MODULE-IV</b>	<b>TRANSPORT LAYER</b>	<b>Classes: 08</b>
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.		
<b>MODULE-V</b>	<b>APPLICATION LAYER</b>	<b>Classes: 08</b>
Introduction, client server programming, WWW (World Wide Web) and HTTP (Hyper Text Transfer Protocol), FTP (File Transfer Protocol), E-mail, telnet, DNS (Domain Naming System), SNMP (Simple Network Management Protocol).		

#### V. Text Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, 5<sup>th</sup> Edition, 2012.
2. Andrew S. Tanenbaum, David.j.Wetherall, "Computer Networks", Prentice-Hall, 5<sup>th</sup> Edition, 2010.

#### VI. Reference Books:

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

#### VII. Web References:

1. <http://computer.howstuffworks.com/computer-networking-channel.htm>
2. <https://www.geeksforgeeks.org/layers-osi-model/>
3. [https://www.wikilectures.eu/w/Computer\\_Network](https://www.wikilectures.eu/w/Computer_Network)

4. <https://technet.microsoft.com/en-us/network/default.aspx>

**VIII. E-Text Books:**

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

**IX. MOOC Course**

1. <https://www.mooc-list.com/course/networking-introduction-computer-networking-stanford-university>
2. <https://lagunita.stanford.edu/courses/Engineering/Networking/Winter2014/about>.