COURSE STRUCTURE

Course Code	**AID0PM06A**				
Course Category	**Program Major**				
Course Title	**Fundamentals of Computer Networks**				
Teaching Scheme	**Lectures**	**Tutorials**	**Laboratory / Practical**	**Project**	**Total**
Weekly load hours	**3**	**-**	**2**	**-**	**5**
Credits	**3**	**-**	**1**	**-**	**4**
Assessment Schema Code	**TL3**				

Prerequisites:

- First Year Pass and A.T.K.T.

Course Objectives:

1.Learn the principles of digital data transmission, communication methodologies, protocols and networking equipment used in data transmission.
2. Build an understanding of the fundamental concepts of computer networking
3. Understand how computers communicate with each other and the methods employed to assure that the communication is reliable.
4.Specialized professionals in computer networking.
5. Boosts confidences to develop physical network.

Course Outcomes:

1. Use basic concepts of networking for setting-up computer networks.
2. Setup a computer network for specific requirement.
3. Select relevant transmission media.
4. Configure basic network services & the different TCP/IP services.
5. Understand IP address, Subnetting for improved network address management.

Course Contents:

Unit-1 Fundamentals of Computer Network

Definition of Computer Network, Need of Computer Network
Applications, Hardware & software Components of a computer network, Example of Networks.
Use of Computer networks Networks for companies, Networks for people, Social Issues.

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Network Benefits/ Advantages- Sharing Information (File Sharing, E-mail) Sharing Resources (Printer Sharing, Application Services). Computer Network Hardware /Classifications- Classification of Network by their Geography: - PAN CAN, LAN, MAN, WAN, Wireless networks. Classification of Network by their Component Role:-Peer to Peer, client-Server Network.

Unit-2 Network Topologies and Networking Devices

Network Topologies – Introduction, Definition, Selection Criteria.Type of Topology – Bus Topology, Ring Topology, Star Topology, Mesh Topology, Tree Topology, Hybrid Topology. Network Control / Connecting Devices -Need of Network Control, Devices, Role of Network Control devices in a Network.

Network Connecting Devices: - Passive & Active Hubs, Switches, Routers, Bridges, Repeaters, Gateways, Modems, wireless infrastructure components, Network Security Devices (firewalls, Proxy Server)

Unit -3 Transmission Media

Overview of data (analog & digital), signal (analog & digital), transmission (analog & digital). Transmission Media-Need of Transmission Media, Classes of Transmission Media, Guided Media(Wired)- Coaxial Cable, Twisted Pair, Fiber Optics Cable Unguided Media (Wireless)- Electromagnetic Spectrum, Radio Waves, Infra-Red, Satellite Micro-Wave.
Latest Technologies in Wireless Network- Bluetooth Architecture, Wireless Fidelity (Wi-Fi), Light Fidelity(Li-Fi), Gigabit Wireless (Gi-Fi), Wi-MAX, Applications of wireless network.

Unit-4 Network Reference Model & TCP/IP Fundamentals

OSI Reference Model – Introduction– Layered Architecture, Peer-to- Peer Processes, Functions of Layers of the OSI Reference Model (Protocols, used) – Physical Layer, Data-Link Layer, Network Layer, Transport, Layer, Session Layer, Presentation Layer, Application Layer. Layered Structure of the TCP/IP Reference Model – Host-to- Network, Internet, Transport, Application layer. Comparison of the OSI and TCP/IP reference models. TCP / IP Protocol: ARP, IP, TCP & UDP, FTP, HTTP, SMTP, TELNET, DNS, DHCP.

Unit-5 IP Addressing

Addressing – Physical/ MAC address & Logical address. **IP Addressing** – IP address Representation, Classful & Classless address, Subnetting, Subnet Masking, and Private IP addresses range & use. **Version of IP**- IPv4 Vs IPv6, **IPV6**- Why we need IPv6 Addressing? Representation of IPv6, IPv6 Address Notation, Types of IPv6 Addresses.

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Laboratory Exercises / Practical: Detailed list of experiment. 1 to 12 (Every experiment consist of more than 3 subprograms)

1. To study and observe all Components of Network in your Computer Network Lab.
   a. Identification of various networking components and state there specifications- BNC, RJ-45, I/O box, switch, Hub etc.
   b. Draw the network layout with its topology for network set-up of your Laboratory.
2. a. Identify transmission media and study there specifications.
   b. Prepare UTP/STP cable in straight and crossover mode and test it by line tester.
3. a. To Create a small physical network using computers, Network connecting device and cables.
   b. Install and Configure Network Interface Card and Identify its MAC Address.
4. Share Files/Folder, devices and printer in the Network and access the shared resources from the other node.
5. a. Install & Configure peer to peer network in laboratory.
   b. Run the following TCP/IP commands with options and record their output:Ping, ipconfig, Tracert, Netstat.
6. a. Install Wireshark & configure packet sniffer software.
   b. Use Wireshark software & Capture TCP, UDP, IP, ARP, ICMP, Telnet, FTP packets.
7. To install & Configure DHCP server.
8. Setup FTP client/server and transfer the file using FTP.
9. Install TCP/IP protocols and configure Advanced features of TCP/IP protocols like IP address, Subnetmask, gateway, primary and secondary DNS.
10. Create IPV6 environment in a small network using Simulator.

Learning Resources:

Text Books/ Reference Books:

- Andrew S. Tanenbaum, "Computer Networks", PHI Learning Pvt. Ltd, ISBN-13:978-0-13-212695-3, Publication Year: 1998.
- Behrouz A. Forouzan, "Data Communication and Networking", Tata McGraw-Hill, ISBN: 9780-07-296775-3 Publication Year: 2006.

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- Godbole Achyut, "Data Communication and Networks", Tata McGraw-Hill, ISBN: 0070472971, Publication Year: 2006.
- Douglas Comer, Internetworking with TCP/IP, Volume 1, Prentice Hall of India, ISBN: 81-203-2065-4, Publication Year: 2006.
- Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2011.

Supplementary Reading:

Web Resources:

Web links: *State of the art in the course*

a. http://www.howstuffworks.com

b. https://www.ipv6.com/general/ipv6-addressing/
c. https://www.tutorialspoint.com/ipv6/ipv6_address_types.htm
d. https://www.brianlinkletter.com/core-network-emulator-test-drive/

MOOCs: *Online courses for self-learning*

a. https://www.mooc-list.com/course/computer-networking

b. https://nptel.ac.in/courses/106103069/

Pedagogy:

- White Board
- Video Lectures
- Power Point Presentations
- Discussion Forum
- Face to face practical

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