

<b>Course Code</b>	<b>40119204</b>			
<b>Category</b>	<b>Core Subject</b>			
<b>Course Title</b>	<b>Fundamentals of Computer Networks (FON)</b>			
<b>Scheme and Credits</b>	<b>Theory</b>	<b>Tutorial</b>	<b>Lab</b>	<b>Credits</b>
	<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>Pre-requisites (if any)</b>	<b>Basic Concept of Data Structures, Operating systems, Programming Language and Knowledge of Linux OS</b>			

**1.Course Objectives:**

1	To equip the students with basics concept of Computer Networks.
2	To familiarize the students with the standard OSI and TCP/IP models and the protocols of various layers for communication in a network.
3	To gain basic understanding of programming for network solutions.
4	Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

**2. Course Contents:**

<b>Unit</b>	<b>Course Content</b>	<b>Weightage</b>
<b>Unit I</b>	<b>Introduction</b> Types of network, network software, protocol hierarchies, design issues for the layers, connection oriented vs. connectionless service, OSI and TCP/IP reference Models  <b>Network Terminologies:</b> Signals, amplitude, frequency, wavelength, bitrate, baud rate, data rate calculation  <b>Networking Components and Devices:</b> Switch, hub, repeater, amplifier, gateway, router and firewall.	<b>15%</b>

	<p>Guided and unguided transmission media – Types of cables and their comparison, network topology, wireless transmission mechanism and electromagnetic spectrum</p> <p>Types of Multiplexing (FDM, TDM) and its advantages and limitations, Types of Modulation (AM, FM, PM) and its advantages and limitations</p>	
<b>Unit II</b>	<p><b>Data link layer:</b>          Design issues, Framing techniques, Error detection and correction. Elementary data link protocols –          Simplex protocols: A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A protocol using Go-Back-N, A protocol using Selective Repeat.</p> <p><b>Medium Access sub layer:</b>          The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Ethernet frame structure, 802.11 wireless frame structure, Bluetooth architecture</p>	<b>25%</b>
<b>Unit III</b>	<p><b>Network Layer:</b>          Network layer design issues, Routing algorithms - shortest path routing, Flooding, distance vector routing, Link State routing, Congestion control algorithms, Network layer protocols (IPv4 and IPv6)</p>	<b>25%</b>
<b>Unit IV</b>	<p><b>Transport Layer:</b>          Transport Services, Elements of Transport protocols, Connection establishment – 3 Way Handshake, connection release – 2 Army problem, Error control, flow control, congestion control, UDP and TCP protocols.</p>	<b>20%</b>
<b>Unit V</b>	<p><b>Application Layer:</b>          Domain name system, Electronic Mail – SMTP, the World Wide Web, HTTP</p>	<b>15%</b>

### 3. Practical List of programs:

1. Install Windows 2003/Windows 2008 Network operating System
2. Install and configure Active Directory Domain Services
3. Install & configure File Server, Proxy Server.
4. Install & test router, repeater and bridge.

5. Implementation of bus topology in Packet Tracer.
6. Implementation of star topology using switch and hub in packet tracer.
7. Implementing routing algorithms in packet tracer.
8. Perform TCP/IP Configuration for PC Network using Packet Tracer.
9. Implement simple TCP socket based Client Server application program using Python
10. Implement simple UDP socket based Client Server application program using Python
11. Study of Wireshark tool.

**4. Text Books:**

1. Andrew S Tanenbaum, David. J. Wetherall, "Computer Networks", Pearson Education, 5th Edition

**5. Reference Books:**

1. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, Fourth Edition
2. Bhushan H Trivedi, "Computer Networks", Oxford University Press

**6. Bibliography:**

1. Download Packet Tracer from <https://www.filehorse.com/download-cisco-packet-tracer-64/>
2. Download Wireshark from its official webpage, it is a network packet analyser <https://www.wireshark.org/>

**7. Accomplishment of the student after completing the course:**

1. Understand concepts of networking and gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
2. Identify the components required to build different types of networks
3. Obtain the skills of subnetting and routing mechanisms.
4. Have a working knowledge of datagram
5. Trace the flow of information from one node to another node in the network