

**VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY NAMBUR-522508 ANDHRA PRADESH, INDIA**

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| Course Code:  20XX5T01 | **Subject Title: COMPUTER NETWORKS**  **(COMMON TO CSE, INF, CSM, CSO, AID & AIM) BRANCHES)** |
| Year and Semester: III Year I semester | |

**Course Objectives:**

1. To summarize OSI and TCP/IP reference models and Example networks, characteristics of transmission media and classify multiplexing techniques
2. To explain the Error Control, Flow Control
3. To Compute optimal path using Routing Algorithms.
4. To summarize the concepts of reliable unreliable transmission
5. To explain the knowledge on various application layer protocols

**UNIT-I: Introduction to Computer Networks and Physical Layer 12 Hrs**

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model – A Comparison of the OSI and TCP/IP Reference Models, Example Networks, Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel Guided Transmission Media, Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing.

**UNIT-II : Data Link Layer 8 Hrs**

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Control Protocols, Sliding Window Protocols, HDLC, PPP.

**UNIT– III: Medium Access Control Sub Layer**  **8 Hrs**

Channel Allocation Problems, Multiple Access Protocols, IEEE standards for Local Area Networks, WLAN, Bluetooth

**UNIT-IV: Network Layer 10 Hrs**

Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internet Protocol Header, IP Addresses, subnetting and super netting.

**UNIT – V: Transport and Application Layers 8 Hrs**

Transport Layer: Design Issues, Connection Establishment, Connection Termination, Transport and User Datagram Protocols

Application layer: Design Issues, DNS, WWW, HTTP/HTTPS, E-mail

**Text Books:**

1. Computer Networks, Andrew S Tanenbaum, Pearson, 5th Edition

2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw Hill, 4th Edition

**Reference Book:**

1. TCP/IP Protocol Suite, Behrouz A Forouzan**,** Tata McGraw Hill Edition, 3rd Edition

**Web Resources:**

1. <https://www.geeksforgeeks.org/computer-network-tutorials/>

2. <https://www.cisco.com/c/en/us/support/docs/ip/routing-information-protocol-rip/13788-3.html>

**Beyond syllabus & New trends:** Wireless networks (802.12 and 802.16) The 3G – 5G networks used by smart phones RFID and sensor networks Content distribution using CDNs Peer-to-peer networks Real-time media (from stored, streaming, and live sources) Internet telephony (voice over IP) Delay-tolerant networks.

**MICRO SYLLABUS OF COMPUTER NETWORKS**

**UNIT-I: Introduction and Physical Layer**

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model – A Comparison of the OSI and TCP/IP Reference Models, Example Networks, Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing

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| **Unit** | **Module** | **Micro content** |
| **Introduction to Computer Networks and Physical Layer** | Introduction | Uses of Computer Networks, Basic Concepts (Line configurations, Topologies, Trans mission modes, Types of Networks (LAN, MAN, WAN), Internet), Network Hardware, Network Software |
| Reference Models | Layers in the OSI and TCP/IP models, Difference of Reference Models. |
| Example Networks | ARPAnet, Novell Netware, ATM Networks |
| Physical Layer & Digital Transmission | Design Issues, Composite Signals, Fourier Analysis, Nyquist Theorem for a noiseless channel, Shannon Theorem for noisy channel, Digital Signals, Bandwidth, Maximum Data Rate of a Channel, |
| Transmission Media | Guided (Twisted, Co-axial & Fiber Cables) and Unguided Transmission (ground propagation, sky propagation, and line-of-sight propagation). |
| Digital Modulation and Multiplexing | Baseband transmission (NRZ, NRZI, Manchester, Differential Manch.), Passband transmission (ASK, FSK, PSK & QAM) FDM, TDM, WDM, CDM |

**UNIT-II: Data Link Layer**

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Control Protocols, Sliding Window Protocols, HDLC, PPP

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| **Unit** | **Module** | **Micro content** |
| **Data Link Layer** | Design Issues | Service provided to the Network layer, Framing, Physical Addressing, Error Control, Flow Control, Access Control (only basic concepts) |
| Error Detection and Correction | Error Detection: VRC, LRC, CRC, Checksum, Single Bit Correction: Hamming Codes |
| Flow Control | Elementary Data Link Control Protocols: An unrestricted Simplex (Utopian), Simplex Stop and Wait, Stop Wait ARQ Sliding Window Protocols: 1-bit Sliding Window, Sliding window using Go Back N, Sliding Window Using Selective Repeat |
| Example Data Link Control Protocols | HDLC, PPP |

**UNIT– III: Medium Access Control Sub Layer**

Channel Allocation Problems, Multiple Access Protocols, IEEE standards for Local Area Networks, WLAN, Bluetooth

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| **Unit** | **Module** | **Micro content** |
| **Medium Access Control Sub Layer** | Channel Allocation Problem | Static Channel Allocation, Dynamic Channel Allocation |
| Multiple Access Protocols | Aloha, CSMA, Collision Free Protocols, Wireless LAN protocols |
| IEEE standards LAN Protocols | IEEE-802.3,802.4,802.5 |
| IEEE WLAN Protocols | IEEE 802.11, Bluetooth |

**UNIT-IV: Network Layer**

Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, Internet Protocol Header, IP Addresses, subnetting and super netting.

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| **Unit** | **Module** | **Micro content** |
| **Network Layer** | Design Issues | Switches(Circuit, packets & message), store and forward packet switching), service provided to the transport layer, Implement of Connection less & Connection Oriented services, Comparison of Virtual Circuit subnets and Datagram Networks |
| Routing Algorithms | Network connecting components (Passive & active Hubs, Repeaters, Bridges, Routers & Gateway), Shortest path, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts |
| IP Headers | IPV4 and IPV6 Header formats |
| IP Addresses | Classful IP Addressing, Classless IP Addressing, Types of IP Addresses  Subnetting and Super netting. |

**UNIT – V: Transport and Application Layers**

Transport Layer Design Issues, Connection Establishment, Connection Termination, Transport and User Datagram Protocols**.** Application layer Design Issues, DNS, WWW, HTTP/HTTPS, E-mail.

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| **Unit** | **Module** | **Micro content** |
| **Transport Layer and Application Layers** | Design Issues | Design Issues, Process Addressing, Service Primitives |
| TCP Phases | Connection Establishment, Connection Termination,  Data Transfer |
| Protocols | TCP, UDP headers |
| Design Issues | File Transfer and Access Management  Network Virtual Terminals  Mail Services |
| DNS | DNS Name space, Resource Records, Name servers |
| WWW | Architecture and overview, Static/Dynamic web pages, |
| HTTP/HTTPS | HTTP Request and Response headers and methods |
| E-mail | Architecture, User Agents, Message formats, Message Transfer Agents, SMTP, MIME, POP. |

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