# COMPUTER NETWORKS LAB

| Course Code | 23CS3552 | Year | III | Semester | I |
|---|---|---|---|---|---|
| Course Category | Professional Core | Branch | CSE | Course Type | Lab |
| Credits | 1.5 | L – T – P | 0-0-3 | Prerequisites | -- |
| Continuous Evaluation: | 30 | Semester End Evaluation: | 70 | Total Marks: | 100 |

| Course Outcomes | | |
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| Upon successful completion of the course, the student will be able to: | | |
| **CO1** | Apply appropriate design techniques to solve computer networking problems using relevant protocols and models, enabling students to develop structured problem-solving approaches for networking scenarios. | L3 |
| **CO2** | Implement networking-related programs and configurations independently using modern tools and simulation platforms such as Packet Tracer, Wireshark, and Python, for building practical skills and tool proficiency in simulating and analyzing network environments. | L3 |
| **CO3** | Develop structured and technically sound laboratory reports demonstrating the implementation and outcomes of various network protocols, encouraging professional documentation practices aligned with engineering standards. | L3 |
| **CO4** | Analyze program results and outputs based on specified test cases and constraints, and communicate findings effectively through oral presentation, promoting critical thinking and articulation of technical observations. | L4 |

| Syllabus | | |
|---|---|---|
| **Exp. No.** | **Experiment Title** | **Mapped COs** |
| **1** | Experiment with the basic network commands like Ping, IPCONFIG, and Tracert in real networks. | CO1 CO2 CO4 |
| **2** | Introduction to Networking Tools and Protocol Layers | CO1 CO2 CO3 |
| **3** | Design & Simulation of Basic Network Topologies (Bus, Ring, Star) | CO1 CO2 CO3 |
| **4** | Static IP Addressing and LAN Configuration | CO2 CO3 |
| **5** | DHCP Configuration and Validation | CO2 CO3 CO4 |
| **6** | Subnetting and IP Planning for a Multi-Network Setup | CO1 CO2 CO3 |
| **7** | Implementation of Static and Dynamic Routing (RIP/OSPF) | CO2, CO3, CO4 |
| **8** | IPv6 Addressing and Dual Stack Configuration | CO1 CO2 CO4 CO3 |
| **9** | VLAN Configuration and Inter-VLAN Routing | CO1 CO2 CO3 |
| **10** | ARP and ICMP Packet Capture and Analysis | CO2 CO3 CO4 |
| **11** | HTTP and DNS Packet Analysis | CO2 CO3 CO4 |
| **12** | TCP vs UDP Header Structure and Behavior | CO3 CO4 |
| **13** | TELNET/SSH Remote Management of Routers | CO2 CO3 CO4 |

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| **14** | NAT Configuration and Verification | CO2 CO3 CO4 |
| **15** | Mini Project: Office or Campus Network Design | CO1 CO2 CO3 CO4 |
| **16** | Wireshark Full-Stack Protocol Analysis & Group Presentations | CO3 CO4 |
| **Content Beyond Experiments** | | |
| **1** | Access Control with ACLs (Standard/Extended) | CO1 CO2 CO3 |
| **2** | Implement WLAN for a given network. | CO1 CO2 CO3 CO4 |
| **3** | Implement STP (Spanning tree protocol) for a given network. | CO1 CO2 CO3 CO4 |

## Learning Resources

### Books

1. **Andrew S. Tanenbaum, David J. Wetherall**, *Computer Networks*, 5th Edition, Pearson Education.
2. **Behrouz A. Forouzan**, *Data Communications and Networking*, 5th Edition, McGraw-Hill Education.
3. **Mayank Dave**, *Computer Networks*, CENGAGE Learning.
4. **Achyut S. Godbole, Atul Kahate**, *Data Communications and Networks*, McGraw-Hill Education.

## Online Simulators & Tools

1. **Cisco Packet Tracer**
   https://www.netacad.com/courses/packet-tracer
   Tool for network topology simulation and router/switch configuration.
2. **Wireshark Network Protocol Analyzer**
   https://www.wireshark.org
   Used for capturing and analyzing live network traffic and protocol headers.
3. **Subnetting Practice Platform**
   https://subnettingpractice.com
   Helps practice CIDR, VLSM, and IP calculations.
4. **Mininet (for advanced labs or project extensions)**
   http://mininet.org
   Lightweight network emulator for software-defined networking (SDN).

## Video Tutorials & Online Courses

- **Cisco Networking Academy**
  https://www.netacad.com
  → Free courses on networking, Packet Tracer, and cybersecurity.
- **NPTEL Online Course – Computer Networks by IIT faculty**
  https://nptel.ac.in/courses/106/105/106105183/
  → Full syllabus coverage with explanations and demonstrations.
- **Wireshark Tutorial for Beginners (YouTube)**
  https://www.youtube.com/watch?v=TkCSr30UojM
  → Step-by-step guide on capturing and analyzing packets.
- **GeeksforGeeks – Computer Networking**
  https://www.geeksforgeeks.org/computer-network-tutorials/
  → Topic-wise conceptual coverage with practical examples.