

**Savitribai Phule Pune University**  
**Third Year of Computer Engineering (2019 Course)**  
**310247:Computer Networks and Security Laboratory**



**Teaching Scheme**  
**Practical: 02 Hours/Week**

**Credit: 01**

**Examination Scheme and Marks**  
**Term work: 25 Marks**  
**Oral: 25 Marks**

**Companion Course:** Computer Network and Security(310244)

**Course Objectives:**

- To learn computer network hardware and software components
- To learn computer network topologies and types of network
- To develop an understanding of various protocols, modern technologies and applications
- To learn modern tools for network traffic analysis
- To learn network programming

**Course Outcomes:**

On completion of the course, learners will be able to

- CO1:** Analyze the requirements of network types, topology and transmission media  
**CO2:** Demonstrate error control, flow control techniques and protocols and analyze them  
**CO3:** Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms  
**CO4:** Develop Client-Server architectures and prototypes  
**CO5:** Implement web applications and services using application layer protocols  
**CO6:** Use network security services and mechanisms

**Guidelines for Instructor's Manual**

The instructor's manual is to be developed as a reference and hands-on resource. It should include prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.

**Guidelines for Student's Laboratory Journal**

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement, Software and Hardware requirements, Assessment grade/marks and assessor's sign, Theory- Concept in brief, algorithm, flowchart, test cases, Test Data Set(if applicable), mathematical model (if applicable), conclusion/analysis. Program codes with sample output of all performed assignments are to be submitted as softcopy. As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers as part of write-ups and program listing to journal must be avoided. Use of DVD containing students programs maintained by Laboratory In-charge is highly encouraged. For reference one or two journals may be maintained with program prints in the Laboratory.

**Guidelines for Laboratory /Term Work Assessment**

Continuous assessment of laboratory work should be based on overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grade/marks based on parameters, such as timely completion, performance, innovation, efficient codes, punctuality and

**Guidelines for Oral Examination**

Oral examination should be jointly conducted by the internal examiner and external examiner. Relevant questions may be asked at the time of evaluation to test the student's understanding of the fundamentals, effective and efficient implementations in term work. This will encourage, transparent evaluation and fair approach, and hence will not create any uncertainty or doubt in the minds of the students. So, adhering to these principles will consummate our team efforts to the promising start of student's academics.

### Guidelines for Laboratory Conduction

The instructor is expected to frame the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. The assignment framing policy need to address the average students and inclusive of an element to attract and promote the intelligent students. Use of open source software is encouraged. Based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus.

Operating System recommended: -64-bit Open-source Linux or its derivative

Programming tools recommended: - Open-Source/C/C++/JAVA

Programming tool like G++/GCC, Wireshark/Ethereal and Packet Tracer

### Virtual Laboratory:

- <http://vlabs.iitb.ac.in/vlab/>

### Suggested List of Laboratory Experiments/Assignments

Assignments from all Groups (A, B, C) are compulsory

Sr. No.	<b>Group A (Unit I and II): Attempt any two assignments from Sr.No. 1 to 3. Assignments 4 and 5 are compulsory.</b>
1.	Setup a wired LAN using Layer 2 Switch. It includes preparation of cable, testing of cable using line tester, configuration machine using IP addresses, testing using PING utility and demonstrating the PING packets captured traces using Wireshark Packet Analyzer Tool.
2.	Demonstrate the different types of topologies and types of transmission media by using a packet tracer tool.
3.	Setup a WAN which contains wired as well as wireless LAN by using a packet tracer tool. Demonstrate transfer of a packet from LAN 1 (wired LAN) to LAN2 (Wireless LAN).
4.	Write a program for error detection and correction for 7/8 bits ASCII codes using Hamming Codes or CRC.
5.	Write a program to simulate Go back N and Selective Repeat Modes of Sliding Window Protocol in Peer-to-Peer mode.
<b>Group B (Unit III and IV)</b>	
6.	Write a program to demonstrate Sub-netting and find subnet masks.
7.	Write a program to implement link state /Distance vector routing protocol to find suitable path for transmission.
8.	Use packet Tracer tool for configuration of 3 router network using one of the following protocol RIP/OSPF/BGP.
9.	Write a program using TCP socket for wired network for following <ol style="list-style-type: none"> <li>Say Hello to Each other</li> <li>File transfer</li> <li>Calculator</li> </ol>
10.	Write a program using UDP Sockets to enable file transfer (Script, Text, Audio and Video one file each) between two machines.
<b>Group C (Unit V and VI): Assignment Sr. No. 11 is Compulsory and attempt any four from Assignments Sr. No 12 to 17.</b>	
11.	Write a program for DNS lookup. Given an IP address as input, it should return URL and vice-versa.
12.	Installing and configure DHCP server and write a program to install the software on remote machine.

13.	Capture packets using Wireshark, write the exact packet capture filter expressions to accomplish the following and save the output in file: 1. Capture all TCP traffic to/from Facebook, during the time when you log in to your Facebook account 2. Capture all HTTP traffic to/from Facebook, when you log in to your Facebook account 3. Write a DISPLAY filter expression to count all TCP packets (captured under item #1) that have the flags SYN, PSH, and RST set. Show the fraction of packets that had each flag set. 4. Count how many TCP packets you received from / sent to Face book, and how many of each were also HTTP packets.
14.	Study and Analyze the performance of HTTP, HTTPS and FTP protocol using Packet tracer tool.
15.	To study the SSL protocol by capturing the packets using Wireshark tool while visiting any SSL secured website (banking, e-commerce etc.).
16.	Illustrate the steps for implementation of S/MIME email security through Microsoft® Office Outlook.
17.	To study the IPsec (ESP and AH) protocol by capturing the packets using Wireshark tool.

**@The CO-PO Mapping Matrix**

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	2	-	2	1	1	-	-	1	-	1
CO2	-	3	-	1	1	-	-	1	-	-	-	-
CO3	3	2	1	1	-	-	-	1	-	-	1	1
CO4	-	1	2	1	1	1	-	-	-	-	-	1
CO5	2	3	-	-	1	-	-	-	1	-	-	-
CO6	-	1	3	1	1	-	1	-	2	-	-	1