Faculty of Science, Technology and Architecture (FoSTA)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
COURSE HAND-OUT
Computer Networks Lab | CSE 3131| 1 Credit | 0 0 2 1

Session: August '25 – November '25

Class: B.Tech. III Year V Semester

Faculty: Dr. Praneet Saurabh, Dr. Ridhi Arora, Dr. Sunil Kumar Patel, Ms. Santoshi Rudrakar, Dr. Sushama, Mr. Vivek Singh Sikarwar, Dr. Usha Jain, Dr. Rishi Srivastva, Dr. Rishav Dubey (Coordinator)

A.   Introduction:

The course aims to introduce students to the fundamental concepts of computer networking. It covers the basics of how networks function and how devices communicate within them. Students will learn about various **connecting devices** like routers, switches, and hubs. They will understand the **implementation of routing** for efficient data transfer. The concept and configuration of **Virtual LANs (VLANs)** will be explored. Topics like **Network Address Translation (NAT)** and **DHCP** will be discussed in detail. Students will also gain hands-on experience with essential **network utilities** and tools. By the end, they will be able to analyze, design, and troubleshoot basic network setups.

B.   Course Outcomes: At the end of the course, students will be able to

[CSE3131.1]   Explain the network simulator, its components, devices. (Level 1 Understand)

[CSE3131.2]   Implement various static and dynamic routing algorithm (Level 2 Apply)

[CSE3131.3]   Configure Network Address Translation (NAT) for managing IP addresses in a network. (Level 3, Apply)

[CSE3131.4]   Use different network utilities like ping, traceroute, and netstat to test to diagnose network issue (Level 3, Apply)

C   PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of basic science and fundamental computing in solving complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.

PO9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse IT teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the BTech CSE program, the student:

PSO1. Design and develop optimized computational solutions using appropriate programming paradigms, contributing to sustainable development to ensure efficient resource utilization.

PSO2. Create intelligent or innovative solutions to real-world challenges by applying modern tools, software engineering practices, and emerging technologies.

PSO3. Process and communicate data effectively while ensuring software security, data privacy, and reliable data communication in practical applications.

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D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Continuous evaluation (viva, quiz, mini project, lab record)	60
End Term Exam (Summative)	End Term Practical Exam (Performance and Viva)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments. (Formative)	Students who miss a class must report the absence to the teacher. A makeup hand written assignment on the topic taught on the day of absence will be given, which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that day of absence will be marked blank, so that the student is not counted as absent. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Course Contents

Introduction to NetSim, Networking Devices: Networking Device Components, Switch and Router, Routing: Static Routing, RIP, OSPF; NAT: Configuring NAT and Troubleshooting, Transmission Control Protocol (TCP) and User Datagram Protocol (UDP), Network Utilities.

TEXTBOOKS:
1. Behrouz A. Forouzan, Data Communication and Networking Protocol, TCP/IP Protocol Suite, 4th Ed., TMH, 2010
2. W. Stallings, Data & Computer Communications (9e), Pearson Education Inc., Noida, 2017.

G. Lab Plan

Lab No.	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Basic Networking Devices	Understand Networking devices	Lecture Demonstration at system	CSE3131.1	Quiz & Continuous Evaluation End Term Examination
2	OSI Model and TCP/IP Model	Understand OSI Model	Lecture Demonstration at system	CSE3131.1	Quiz & Continuous Evaluation End Term Examination
3	Introduction to NetSim	Understand NetSim network simulator	Lecture Demonstration at system	CSE3131.1	Continuous Evaluation End Term Examination
4	Understand Measures of Network Performance: Throughput and Delay	Understand throughput and delay	Lecture Demonstration at system	CSE3131.1	Continuous Evaluation End Term Examination
5	Understand working of ARP, and IP Forwarding within a LAN and across a router	Understand ARP	Lecture Demonstration at system	CSE3131.2	Continuous Evaluation End Term Examination
6	Simulate and study the spanning tree protocol	Understand spanning tree protocol	Lecture Demonstration at system	CSE3131.2	Continuous Evaluation End Term Examination
7	Study the working and routing table formation of Interior routing protocols, i.e. Routing Information Protocol (RIP) and Open Shortest Path First (OSPF)	Understand routing protocols	Lecture Demonstration at system	CSE3131.2	Continuous Evaluation End Term Examination
8	Introduction to TCP connection management	Understand TCP connection management	Lecture Demonstration at system	CSE3131.3	Continuous Evaluation End Term Examination

9	Reliable data transfer with TCP	Understand reliable data transfer	Lecture Demonstration at system	CSE3131.3	Continuous Evaluation End Term Examination
10	TCP Congestion Control Algorithms	Understand congestion control	Lecture Demonstration at system	CSE3131.3	Continuous Evaluation End Term Examination
11	Understanding Public IP Address & NAT (Network Address Translation)	Understand NAT	Lecture Demonstration at system	CSE3131.3	Continuous Evaluation End Term Examination
12	Understand the working of basic networking commands (Ping, Route Add/Delete/Print, ACL)	Demonstrate the use of network utilities	Lecture Demonstration at system	CSE3131.4	Continuous Evaluation End Term Examination

H. Target attainment (%) for course outcomes:

CO	Target attainment (%)
CSE3131.1	80%
CSE3131.2	80%
CSE3131.3	80%
CSE3131.4	80%

I   Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE3131.1	Explain the network simulator, its components, devices. (Level 1 Understand)	1	1	2	2	1	1		1	1		1		1	1	
CSE3131.1	Implement various static and dynamic routing algorithm (Level 2 Apply)	1	1	1										1		
CSE3131.1	Configure Network Address Translation (NAT) for managing IP addresses in a network. (Level 3, Apply)	1	1	1										1		
CSE3131.1	Use different network utilities like ping, traceroute, and netstat to test to diagnose network issue (Level 3, Apply)	1		1					1	1	1	1		1		