GRAPHIC ERA HILL UNIVERSITY, DEHRADUN

SEMESTER VI

Name of Department: - Computer Science and Engineering | **Computer Networks**

1. Subject Code: **PCS 604** Course Title:
2. Contact Hours: **L:** 0 **T**: 0 **P**: 2
3. Examination Duration (Hrs): **Theory** 0 **Practical** 2
4. Relative Weight: **CIE** 0 **PRS** 25 **MSE** 25 **SEE** 0 **PRE** 50
5. Credits:
6. Semester: **6th**
7. Category of Course: **DC**
8. Pre-requisite: Computer Networks

9. **Course Outcome**:**	**After completion of the course the students will be able to:** **CO1:** Understand various components that make up a computer network, including routers, switches, hubs, servers, and clients and learn about the basic commands used troubleshooting. **CO2:** Design UTP cable for cross and direct connection using crimping tool. **CO3:** Implement the common network protocols such as TCP/IP, UDP, HTTP, DNS, DHC, FTP and NAT Understand how these protocols function and their role in facilitating communication between devices using network simulation tool like Packet tracer. **CO4:** Apply the static and dynamic routing concepts in the network core and monitoring network traffic using Wireshark and develop skills in troubleshooting network connectivity issues. **CO5:** Design network applications using UDP and TCP socket programing concepts and network design principles and test these applications using real or virtual network devices.

*** Describe the specific knowledge, skills or competencies the students are expected to acquire or demonstrate.*

10. **Details of the Course:**

Sl. No.	List of problems for which student should develop program and execute in the Laboratory	Contact Hours
1.	**Problem Statement 1:** Familiarization of Network Environment, Understanding and using network utilities: ipconfig, netstat, ping, telnet, ftp, traceroute etc.	2
2.	**Problem Statement 2:**	2

	Familiarization with Transmission media and tools: Co-axial cable, UTP cable, Crimping tool, Connectors etc. Preparing the UTP cable for cross and direct connection using crimping tool.	
3.	**Problem Statement 3:** Installation and introduction of simulation tool. **(Packet Tracer)**	2
4.	**Problem Statement 4:** To configure a basic network topology consisting of routers, switches, and end devices such as PCs or laptops. Configure IP addresses and establish connectivity between devices. **(Using packet Tracer)**	2
5.	**Problem Statement 5:** To configure a DHCP server on a router or a dedicated DHCP server device. Assign IP addresses dynamically to devices on the network and verify successful address assignment. **(Using packet Tracer)**	2
6.	**Problem Statement 6:** To configure a local DNS server to resolve domain names within a network**. (Using packet Tracer)**	2
7.	**Problem Statement 7:** NAT (Network Address Translation): Set up NAT on a router to translate private IP addresses to public IP addresses for outbound internet connectivity. Test the translation and examine how NAT helps conserve IPv4 address space. **(Using packet Tracer)**	2
8.	**Problem Statement 8:** Network Troubleshooting: Simulate network issues such as connectivity problems, incorrect configurations, or routing failures. Use **Packet Tracer's** simulation mode to diagnose and troubleshoot the network.	2
9.	**Problem Statement 9:** To monitor network traffic using **Wire Shark**	2
10.	**Problem Statement 10:** To analyze complete TCP/IP protocol suite layer's headers using **Wire Shark**	2
11.	**Problem Statement 11:** TCP Client-Server Communication: Implement a TCP client program that sends a message to a TCP server program. Implement the corresponding TCP server program that receives the message and displays it. Test communication between the client and server by exchanging messages **(Using 'C' Language)**	2

12.	**Problem Statement 12:** UDP Client-Server Communication: Implement a UDP client program that sends a message to a UDP server program. Implement the corresponding UDP server program that receives the message and displays it **(Using 'C' Language)**	2
1.	**Optional programs for advanced learner** **Problem Statement 1:** File Transfer using TCP: Implement a TCP server program that listens for incoming connections. Implement a TCP client program that sends a file to the server. The server should receive the file and save it on the local machine. Verify the successful transfer by comparing the original file with the received file	
2.	**Problem Statement 2:** Chat Application using TCP: Implement a TCP client program for a chat application. Implement the corresponding TCP server program. Multiple clients should be able to connect to the server and exchange messages. Test the chat application by simulating multiple clients communicating with each other.	
3.	**Problem Statement 3:** DNS Lookup using UDP: Implement a UDP client program that sends a domain name to a DNS server. Implement the corresponding DNS server program that resolves the domain name to an IP address. The server should send the resolved IP address back to the client. Test the program by performing DNS lookups for different domain names	
4.	**Problem Statement 4:** HTTP Server using TCP: Implement a TCP server program that acts as an HTTP server. The server should be able to handle HTTP requests and send back appropriate HTTP responses. Test the server by accessing it through a web browser and requesting different resources.	

11**. Suggested Books:**

S. No.	Name of Authors/Books/Publishers	Year of Publication / Reprint
	Text Books	
1.	Behrouz A. Forouzan, "Data Communications and Networking with TCPIP Protocol Suite, 6/e", McGraw Hill	**2022**
	Reference Books	
1.	Ross and Kurose, Computer Networking: "A Top-Down Approach (5th edition)", Pearson/Addison-Wesley	**2017**

12.	**Mode of Evaluation**	Test / Quiz / Assignment / Mid Term Exam / End Term Exam