



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Post Graduate Diploma

Level: PG Diploma

Branch: Cyber Security

Subject Code : PI01001021

Subject Name : Fundamentals of Networking and Security

w. e. f. Academic Year:	2025-26
Semester:	1
Category of the Course:	Core Course

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
CO-1	Understand the fundamental concepts of computer networks and their architectures
CO-2	Analyze network models, communication protocols, and IP addressing schemes.
CO-3	Implement network security measures and assess vulnerabilities.
CO-4	Apply cryptographic techniques for secure communication.
CO-5	Configure wireless security mechanisms and perform ethical hacking
CO-6	Explore emerging trends in networking and security, including cloud and IoT security.

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
4	0	2	5	70	30	20	30	150

Course Content:

Sr. No.	Content	Teaching Hours	Module Weightage (%)
1	Introduction to Computer Networks: Basics of Networking, Types of Networks (LAN, WAN, MAN, PAN), Network Topologies, Transmission Media (Wired & Wireless)	6	12



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2	Network Models and Communication : OSI and TCP/IP Models, Network Devices (Router, Switch, Hub, Bridge, Gateway), Data Transmission Methods (Unicast, Multicast, Broadcast), Switching Techniques (Circuit, Packet, Message Switching)	6	12
3	IP Addressing and Network Protocols: IPv4 and IPv6 Addressing, Subnetting and Supernetting, Network Address Translation (NAT), Transport Layer Protocols (TCP, UDP), Application Layer Protocols (HTTP, FTP, SMTP, DNS)	8	15
4	Network Security Fundamentals: Principles of Network Security (CIA Triad), Cybersecurity Threats and Attacks (Phishing, Malware, DoS, MITM), Security Mechanisms: Firewalls, IDS, IPS, Virtual Private Networks (VPNs) and Secure Remote Access	8	15
5	Cryptography & Secure Communication: Encryption and Decryption Basics, Symmetric Encryption (AES, DES), Asymmetric Encryption (RSA, ECC), Hashing Algorithms (SHA, MD5), Digital Signatures & Certificates	8	15
6	Wireless Security & Ethical Hacking: Wireless Security Protocols (WEP, WPA, WPA2, WPA3), Intrusion Detection & Prevention, Penetration Testing Basics, Ethical Hacking Tools (Kali Linux, Metasploit, Wireshark)	8	15
7	Emerging Trends in Networking and Security: Cloud Security Concepts, IoT Security Challenges, Artificial Intelligence in Cybersecurity, Blockchain for Network Security	8	16

References/Suggested Learning Resources:

(a) Books:

1. "Computer Networking: A Top-Down Approach" – James F. Kurose, Keith W. Ross
2. "Data Communications and Networking" – Behrouz A. Forouzan
3. "Cryptography and Network Security: Principles and Practice" – William Stallings
4. "Network Security Essentials: Applications and Standards" – William Stallings
5. "Hacking: The Art of Exploitation" – Jon Erickson
6. "Practical Packet Analysis: Using Wireshark to Solve Real-World Network Problems" – Chris Sanders



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List of Experiments

- 1) Implement different network topologies using Cisco Packet Tracer
- 2) Configure and troubleshoot IPv4 & IPv6 addressing
- 3) Perform subnetting and network design calculations
- 4) Capture and analyze network packets using Wireshark
- 5) Configure and test a firewall for traffic filtering
- 6) Set up and analyze a VPN connection
- 7) Implement encryption and decryption using OpenSSL
- 8) Simulate and mitigate a DoS attack in a virtual environment
- 9) Configure wireless security settings (WPA2, MAC filtering)
- 10) Perform a basic penetration test using Kali Linux & Metasploit

List of open Source software/learning Websites:

- <https://nptel.ac.in/>
- <https://www.udemy.com/>
- <https://www.cybrary.it/>, <https://www.netacad.com/>

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