DEPARTMENT OF
CYBER
SECURITY
FACULTY OF COMPUTING & ARTIFICAL INTELLIGENCE

Lab Outline

Lab Computer Networks (CY-303) Fall – 2021

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Course Objective:

To introduce the basics of networking devices such as cables, hubs and switches, routers, servers and clients, and network topologies, whereas the main focus of the course is the layered architecture and protocols. Students will learn about functionalities and protocols of Open Systems Interconnection (OSI) and TCP/IP communication model. Students will get familiarized with circuit switching and packet switching, LAN technologies, MAC addressing, network layer protocols, IPv4 and IPv6, IP addressing, sub netting, CIDR, routing protocols, transport layer protocols, ports and sockets, connection establishment, flow and congestion control, application layer protocols. Besides the theoretical foundations, students will acquire practical experience in lab.

Course Prerequisites:

- No prerequisites required

Course Learning Outcomes (CLO):

After completion of the course, the student shall be able to:

CLO #	Description	PLO #	Level
CLO1	**Describe** the key terminologies and technologies of computer networks	**PLO 1**	**Understanding**
CLO2	**Explain** the services, functions and standards (RFCs) for each layer in the Internet protocol stack	**PLO 3**	**Understanding**
CLO3	**Identify** various internetworking devices, protocols, and their functions in a network		
CLO4	**Analyze** working and performance of key technologies, algorithms, and protocols	**PLO 1, 5**	**Understanding and Applying**
CLO5	**Design** and **develop** network protocols, applications, and components based on RFCs.		
CLO6 for Lab	Build Computer Network on various topologies, Wireshark, sniffing tools usage, and development. (LAB)	**PLO 4, 5, 6**	**Applying**

CLO/PLO Mapping:

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10
CLO 1	X									
CLO 2										
CLO 3			X							
CLO 4	X				X					
CLO 5										
CLO 6				X	X	X				

Course Outline for LAB:

Week	LAB Details	LAB Manuals	CLO #
Week 1 & 2	**Introduction to Network Devices** • Intro to Network Core devices • Router, Switches and Hubs • Intro to Network edge devices • PCs, mobile and IOT devices	**Intro session**	**CLO1 & CLO3**
Week 3 & 4	**Introduction to IP Addressing** • IP Address classes • Sub-netting • Network-Host Division • IP Class range • Private and Public IP Address	**Lab 1**	**CLO1**
Week 4	**Network Commands** • PING • TRACERT	**Lab 2**	**CLO3 & CLO6**
Week 5	**Network Commands** • PATHPING • NETSTAT	**Lab 3**	**CLO3 & CLO6**
Week 6	**Network Commands** • NET USER • NET SHARE	**Lab 4**	**CLO3 & CLO6**
Week 7	**Network Commands** • ARP • IPCONFIG • NETSH • ROUTE	**Lab 5**	**CLO3 & CLO6**
Week 8	**Packet Tracer - Introduction** • Download (latest Version) • Installation (Windows) • Simple Network Hierarchy • Peer To Peer Network • Real-time Mode • Simulation Mode **Packet Tracer Hub Based Network** • Introduction to Hubs • Working of a Hub • Creating Hub-based Network • Perform Communication in Real-time Mode • Trace packets in Simulation Mode	**Lab 6**	**CLO3 & CLO6**
	Packet Tracer – Switch Based Network • Introduction to Switches		

Week 9 & 10	• Working of a switch • Creating Network Topology with Switch • Perform Communication in Real-time Mode • Trace packets in Simulation Mode **Packet Tracer – Switch-Hub based Network** • Revise working of a Hub • Revise working of a Switch • Network topology combining hubs and switches • Perform Communication in Real-time Mode • Trace packets in Simulation Mode	**Lab 7**	**CLO3 & CLO6**
Week 11	**Packet Tracer - Router** • Introduction to Router • Working of a Router • Configuration of Router • Creating Network with Router and Switches • Inter-LAN Communication with Router • Static Routing Using Router • Perform Communication in Real-time Mode • Trace packets in Simulation Mode	**Lab 8**	**CLO3 &** **CLO6**
Week 12	**Wireshark - Introduction** • Introduction to Wireshark • Introduction to packet capturing • Capturing packets of ICMP (Ping) • Capturing packets of TCP • Intro to other protocols UDP, SNMP, SMTP	**Lab 9**	**CLO 6**

Week 13	**Wireshark**
	• Deep dive in packet capture
	• Analysis of captured packets
	• Filtering based upon:
	  • IP Addresses (source, destination)
	  • Port (source, destination)
	  • Protocols (ICMP, TCP, UDP)
	• Analysis of Data Frames of Wireshark
	  • Frame 1 (Interface)
	  • Ethernet Frame
	  • Internet Protocol Version
	  • Transmission Control Protocol
	  • Transport Layer Security
		Lab 10	**CLO 6**

Week 14	**Revision** • Lab tasks • Network commands • Network devices • Network topologies • Packet Capturing • Packet Analysis	**Lab 11**	**CLO 1, CLO 3 & CLO 6**

General Grading Policy:

Sr. #	Weightage
Quizzes	5%
Assignments	10%
Lab	10%
Mid-Term	30%
Final	45%
Total	100%

Grading and General Course Policies:

- Assignments and/or grade percentages are subject to change
- No makeup quizzes / assignments
- No late assignments will be accepted
- **An 'F' grade will be allotted if projects/Assignments are found copied from internet or any other sources**

Reference Materials:

- Computer Networking: A Top-Down Approach Featuring the Internet, 6th edition by James F. Kurose and Keith W. Ross
- Data Communication and Computer Networks, 5th Edition by Behrouz A. Forouzan
- Computer Networks, 5th Edition by Andrew S. Tanenbaum
- Data and Computer Communications, 10th Edition by William Stallings