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SEMESTER S4

COMPUTER NETWORKS LAB

Course Code	PCITL407	CIE Marks	50
Teaching Hours/Week (L: T:P: R)	0:0:3:0	ESE Marks	50
Credits	2	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Lab

Course Objectives:

1. To familiarize students with internetworking concepts and provide hands-on experience in identifying, configuring, and troubleshooting key network components such as routers, switches, and network interfaces

2. To enable students to configure, implement, and verify both static and dynamic routing protocols, ensuring effective and efficient routing within a network.

3. To equip students with the skills to design, implement, and manage Virtual LANs (VLANs) as well as configure and apply standard and extended access control lists (ACLs) for network security and traffic management.

4. To teach students how to use remote login, file transfer, and automatic network configuration protocols such as Telnet, FTP, and DHCP, enhancing their ability to manage and automate network operations.

Experiment No.	Experiments
1	Familiarization of network components- Hub, Switch, Bridge, Router, Access Point, Network cables, Colour coding, Crimping.
2	Familiarization of Internetworking operating system – access the CLI, switch between different command modes, basic IOS commands - to display device information and configurations, to configure interface and basic troubleshooting.
3	Study of IPv4, IPv6 addresses and subnetting.
4	Configure and verify IPv4 static routing in a network that includes subnetting.
5	Configure and verify Routing Information Protocol (RIP) for dynamic routing in a network that includes subnetting.
6	Configure and verify Enhanced Interior Gateway Routing Protocol (EIGRP) routing in a network that includes subnetting.
7	Configure and verify Open Shortest Path First (OSPF) routing in a network that includes subnetting.

8	Implement Unicast IPv6 Addresses on routers and verify static routing, RIPNG and OSPFv3.
9	Create and apply Standard and Extended ACLs on routers to filter traffic based on IP addresses and protocols.
10	Configure VLANs and implement Inter-VLAN routing using router on a stick technique.
11	Configure TELNET, login to a remote machine and view the files on the remote machine. Configure FTP and transfer files between two machines.
12	Configure and verify the operation of a DHCP (Dynamic Host Configuration Protocol) server in a network.
13	Configure and verify Network Address Translation (NAT) on a router.
14	Familiarize with any popular network simulator.

Course Assessment Method
(CIE: 50 marks, ESE: 50 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Internal Examination	Total
5	25	20	50

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	15	10	10	5	50

- *Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.*

- *Endorsement by External Examiner: The external examiner shall endorse the record*

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	**Bloom's Knowledge Level (KL)**
CO1	Demonstrate internetworking and network components	**K3**
CO2	Configure and verify both static and dynamic routing protocols	**K3**
CO3	Develop the ability to implement and manage VLANs, standard and extended access lists.	**K3**
CO4	Use remote login, file transfer and automatic network configuration protocols	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	2	-	-	-	-	-	2	-	2
CO2	3	2	3	2	-	-	-	-	3	2	-	2
CO3	3	2	3	2	-	-	-	-	3	2	-	2
CO4	3	2	3	2	-	-	-	-	3	2	-	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	CCNA 200-301 Official Cert Guide, Volume 1	Wendell Odom	Cisco Press	2nd Edition 2024
2	CCNA –Cisco Certified Network Associate. Study Guide	Todd Lammle	Wiley India	6th Edition 2007

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Computer Networking: The Complete Beginner's Guide to Learning the Basics of Network Security, Computer Architecture, Wireless Technology and Communications Systems	Benjamin Walker	Science & Technology	2019
2	Computer Networking Bible: The Complete Crash Course to Effectively Design, Implement and Manage Networks.	Rick C. Worley	Independently published	2023

Video Links (NPTEL, SWAYAM…)	
Link No.	Link ID
1	https://archive.nptel.ac.in/courses/106/106/106106091/
2	https://archive.nptel.ac.in/courses/106/105/106105081/
3	https://archive.nptel.ac.in/courses/106/105/106105183/
4	https://archive.nptel.ac.in/courses/106/106/106106243/

Continuous Assessment (25 Marks):

5. **Preparation and Pre-Lab Work (7 Marks)**
   - Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
   - Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

6. **Conduct of Experiments (7 Marks)**
   - Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
   - Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
   - Teamwork: Collaboration and participation in group experiments.

7. **Lab Reports and Record Keeping (6 Marks)**
   - Quality of Reports: Clarity, completeness, and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
   - Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

8. **Viva Voce (5 Marks)**
   - Oral Examination: Ability to explain the experiment, results, and underlying principles during a viva voce session.

Final Marks Averaging: The final marks for preparation, conduct of experiments, viva, and record are the average of all the specified experiments in the syllabus.

Evaluation Pattern for End Semester Examination (50 Marks):

6. **Procedure/Preliminary Work/Design/Algorithm (10 Marks)**
   - Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.

- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
- Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
- Creativity and logic in algorithm or experimental design.

7. **Conduct of Experiment/Execution of Work/Programming (15 Marks)**

- Setup and Execution: Proper setup and accurate execution of the experiment or programming task.

8. **Result with Valid Inference/Quality of Output (10 Marks)**

- Accuracy of Results: Precision and correctness of the obtained results.
- Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.
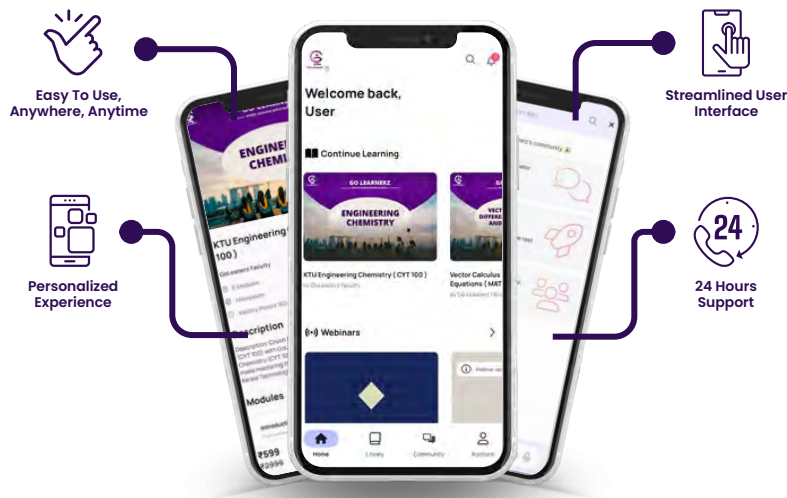
9. **Viva Voce (10 Marks)**

- Ability to explain the experiment, procedure results and answer related question.
- Proficiency in answering questions related to theoretical and practical aspects of the subject.

10. **Record (5 Marks)**

- Completeness, clarity, and accuracy of the lab record submitted

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