(DEEMED TO BE UNIVERSITY)

COMPUTER NETWORKS

24CS2202

LAB WORKBOOK

TEAM CN

COMPUTER NETWORKS – 24CS2202

(DEEMED TO BE UNIVERSITY)

COMPUTER NETWORKS

Course Code: 24CS2202

Student ID	
Student Name	
Branch	
Section	
Academic Year	
Semester	

DEPARTMENT

OF

COMPUTER SCIENCE & ENGINEERING

Vision

To be a globally competent in computing education and research, fostering innovation, industry collaboration, and technological advancements for societal impact.

Mission

M1: To impart high-quality computing education that integrates theory, practice, and industry relevance.

M2: To advance research and innovation in emerging global technologies for real- world impact.

M3: To foster an entrepreneurial mindset, interdisciplinary collaboration, and lifelong learning.

M4: To promote responsible and ethical computing for the benefit of society.

M5: To prepare graduates for leadership in the global technology ecosystem.

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A.Y. 2025-26 LAB CONTINUOUS EVALUATION

Sl. No.	Date	Experiment Name	Pre-Lab (10M)	In-Lab (25M)			Post-Lab (10M)	Viva Voce (5M)	Total (50M)	Faculty Signature
				Program / Procedure (5M)	Data and Results (10M)	Analysis & Inference (10M)				
For Regular, Advanced and Peer Mentors:										
1.		Introduction to the laboratory and the tool used Cisco packet tracer								
2.		Execute the following networking commands like ipconfig, tracert, telnet, netsh, ping, nslookup and netstat in the command prompt with simple topology.								
3.		Configuration of basic switch setup using Cisco Packet Tracer								
4.		Construction of Different VLANS and TRUNKING using cisco packet tracer								
5.		Configuration of Encapsulation dot 1Q using cisco packet tracer								
6.		Configuration of Network address translation in Cisco packet tracer and verify the configuration								
7.		Configuration of ARP and DHCP in Cisco packet tracer and verify the configuration								

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				Program / Procedure (5M)	Data and Results (10M)	Analysis & Inference (10M)				
8.		Configuration of Static Routing using Cisco network switch and verify the connectivity								
9.		Configuration of RIP and OSPF using Cisco network switch and verify the connectivity								
10.		Configure the Standard and Extended Access Control List using cisco packet tracer								
11.		Configuration of SMTP, FTP, DNS, HTTP in Cisco packet tracer and verify the connection								
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Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Lab 1: Introduction to the laboratory and the tool used Cisco packet tracer

Date of the Session:___/___/____ Session Time:____to_____

Learning outcome:

- Understand the purpose and importance of using a network simulation tool like Cisco Packet Tracer.
- Gain familiarity with the user interface and basic functionality of Cisco Packet Tracer.
- Learn how to navigate and explore the virtual network environment within Cisco Packet Tracer.
- Acquire knowledge of the various networking devices and components available in Cisco Packet Tracer and their respective functions.

Pre-Lab Task:

1. What is the purpose of a laboratory in the context of networking and IT?

2. Why is it important to familiarize yourself with the tools and equipment used in a networking laboratory?

3. What is Cisco Packet Tracer, and what is its primary function?

4. What are the key features and capabilities of Cisco Packet Tracer?

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In Lab Task:

Lab 1: Introduction to the laboratory and the tool used Cisco packet tracer

Writing space for the Problem: (For Student's use only)

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VIVA-VOCE Questions (In-Lab):

1. What is the purpose of a laboratory environment in networking education?
2. Why is it beneficial to use a network simulation tool like Cisco Packet Tracer?
3. Describe some advantages of using Cisco Packet Tracer over physical equipment for network simulations.
4. How does Cisco Packet Tracer replicate real-world networking scenarios?
5. What are the key components and tools available in Cisco Packet Tracer?

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Post Lab Task:

1. What is the purpose of a laboratory in networking, and why is it important to practice with tools like Cisco Packet Tracer?

2. How can Cisco Packet Tracer be used to simulate network environments and test different networking scenarios?

3. What are the key features and capabilities of Cisco Packet Tracer that make it a valuable tool for network simulation and learning?

4. How can you create a basic network topology using Cisco Packet Tracer, and what are the essential components needed for a functioning network?

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
	Signature of the Evaluator with Date

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Lab 2: Execute the following networking commands like ipconfig, tracert, telnet, netsh, ping, nslookup and netstat in the command prompt prompt with simple topology.

Date of the Session:___/___/____ Session Time:____to_____

Learning outcome:

- Understand the purpose of ipconfig and use ipconfig to display network configuration information for a Windows computer.
- Learn how to use ping to test network connectivity to a remote host.
- Learn how to use tracert and netstat to trace the route taken by network packets to a destination.
- Understand the purpose of nslookup (Name Server Lookup) and use nslookup to query DNS servers for information about domain names and IP addresses.

Pre-Lab Task:

1. Ensure you have access to a Windows computer or virtual machine where you can practice the various DOS commands.

2. Review fundamental networking concepts like IP addresses, DNS, and routing. Understand what these commands are used for and why.

3. Before starting the lab, use ping to verify that your Windows machine has network connectivity. This will also help you practice the ping command.

4. Familiarize yourself with the syntax and basic usage of each command. You don't need to memorize them, but knowing the basics helps.

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In Lab Task:

Lab 2: Executing the commands ipconfig, tracert, telnet, netsh, ping, nslookup and netstat in the command prompt

Writing space for the Problem: (For Student's use only)

1. **ipconfig command**

2. **ping command**

3. **tracert command**

4. telnet command

5. netsh command

6. nslookup command

7. netstat command

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VIVA-VOCE Questions (In-Lab):

1. What is the primary purpose of the ipconfig command?
2. How does tracert determine the route a packet takes to reach a destination host?
3. What is netsh, and how is it used for configuring network settings?
4. Describe the primary function of the nslookup command.
5. What is the role of the netstat command in a network environment?

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Post Lab Task:

1. Describe a situation where you might use the tracert command in a real-world networking problem.

2. Provide an example of a specific network configuration task that you performed using the netsh command during the lab. What were the steps involved in accomplishing this task?

3. Describe the types of information you obtained from the netstat command during the lab.

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
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Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Lab 3: Configuration of basic switch setup using Cisco Packet Tracer.

Date of the Session:_____/___/____ **Session Time:____to_____**

Learning outcome:

- Identify and understand the physical components of a Cisco network switch, such as ports, LEDs, and console interfaces.
- Understand the concept of user authentication and password management.
- Develop the ability to navigate the switch's CLI, including using basic commands to view system information and switch status.
- Understand the essential settings, such as hostname, IP address, and gateway to make the switch accessible on the network
- Develop an understanding of best practices for switch configuration and management to ensure a stable and secure network.

Pre-Lab Task

1. Review the documentation and manuals for the specific Cisco switch model you will be working with. Familiarize yourself with its features, capabilities, and command-line interface (CLI).

2. Describe the basic components and ports found on a Cisco network switch, and explain their functions.

3. Give some common network switch configurations that need to be considered before setting up a switch, such as VLANs, port security, and spanning tree protocol?

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4. To connect a Cisco network switch to other networking devices, such as routers, servers, and computers?

In Lab Task:

Basic switch setup using Cisco network switch

Writing space for the Problem :(For Student's use only)

Device Configuration details

Device Type	Device Name(Label)	IP Address	Subnet Mask

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Topology Diagram

Switch Configuration Commands:

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
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Output

VIVA-VOCE Questions (In-Lab):

1. What is the purpose of a network switch, and how does it differ from other networking devices?
2. Describe the steps involved in the initial setup of a Huawei network switch.
3. How do you connect to a Huawei switch for configuration purposes?
4. What is the default login username and password for a Huawei switch?
5. Explain the process of assigning an IP address to a Huawei switch.

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Post Lab Task:

1. What is the purpose of a network switch, and why is it an essential component in a computer network?

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2. Describe the basic setup process for a Cisco network switch, including the necessary connections and initial configurations.

3. What are the different types of interfaces available on a Cisco switch, and how can they be used to connect devices in a network?

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Lab 4: Construction of Different VLANS and TRUNKING using cisco packet tracer

Date of the Session:___/___/____ Session Time:____to_____

Learning Outcome:

- Students should be able to explain what VLANs are and understand their purpose in network segmentation
- Understand how VLANs can improve network performance, security, and management.
- Configure VLANs on network switches, including creating, modifying, and deleting VLANs.
- Understand the concept of VLANs (Virtual Local Area Networks) and their significance in network segmentation and management.
- Understand and configure trunk ports on switches to allow the passage of VLAN traffic between switches.

Pre-Lab Task:

1. Identify the number of VLANs you need, their purpose, and the devices that will be part of each VLAN?

2. Ensure you have access to the necessary equipment, including the network switch that supports VLANs and trunking.

3. Plan the IP addressing scheme for your network, including IP subnets and subnet masks and Allocate IP addresses for your devices within each VLAN.

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
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In Lab Task: Construction of different VLANS and TRUNKING using cisco packet tracer

Creating different VLANs (Virtual LANs) and configuring trunking between switches are common tasks in networking, and they can be effectively simulated using Cisco Packet Tracer. Here are the steps involved in constructing different VLANs and trunking using Cisco Packet Tracer:

Construction of Different VLANs:

1. Open Cisco Packet Tracer:

- Launch the Cisco Packet Tracer application on your computer.

2. Create the Network Topology:

- Add the required network devices to the workspace. For VLANs, you'll need multiple switches. Connect them using appropriate cables.

3. Access Switches:

- Double-click on each switch to access the device configuration.

4. Enter Global Configuration Mode:

- Enter global configuration mode using the following command:

  Switch> enable Switch# configure terminal

5. Create VLANs:

- Use the following command to create VLANs. Replace **<vlan_id>** with the desired VLAN ID.

  Switch(config)# vlan <vlan_id>

6. Assign VLAN Names:

- Optionally, assign names to the VLANs for better identification:

Switch(config-vlan)# name <vlan_name>

7. Assign VLANs to Switch Ports:

- Navigate to individual switch interfaces and assign them to specific VLANs:

  Switch(config)# interface <interface_type> <interface_number>

  Switch(config-if)# switchport mode access

  Switch(config-if)# switchport access vlan <vlan_id>

- Repeat this process for each switch interface and VLAN.

8. Verify VLAN Configuration:

- Use the following commands to verify your VLAN configuration:

  Switch# show vlan Switch# show interfaces switchport

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Configuration of Trunking:

1. Connect Two Switches:

- Ensure that two switches are connected. Use a straight-through cable between their trunking interfaces.

2. Configure Trunking on the Interface:

- Access the configuration mode of the interface connected to the other switch and configure it as a trunk port:

  Switch(config)# interface <interface_type> <interface_number>

  Switch(config-if)# switchport mode trunk

3. Set Allowed VLANs:

- Optionally, restrict the allowed VLANs on the trunk to improve security:

  Switch(config-if)# switchport trunk allowed vlan <vlan_list>

- Replace **<vlan_list>** with a comma-separated list of VLAN IDs.

4. Verify Trunk Configuration:

- Use the following command to verify the trunk configuration:

  Switch# show interfaces trunk

5. Repeat for Additional Switches:

- If you have more switches, repeat the trunking configuration between them, connecting the trunking interfaces.

6. Test Connectivity:

- Connect devices to the VLANs on different switches and verify that they can communicate across the network.

By following these steps, you can construct different VLANs and configure trunking between switches using Cisco Packet Tracer.

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Writing space for the Problem: (For Student's use only)

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Topology Diagram

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

VLAN configuration in Switches
Switch-A

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
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VLAN configuration in Switches
Switch-B

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
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Output

VIVA-VOCE Questions (In-Lab):

1. Explain the concept of trunking. How does it differ from access ports on a network switch?
2. What are the advantages and disadvantages of using VLANs in a network design?
3. Can you describe the process of creating a new VLAN on a network switch?
4. How do you assign ports to a specific VLAN on a network switch?
5. How can you verify that your VLAN and trunking configurations are working correctly??

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Post Lab Task:

1. Were the VLAN configurations on the network switch error-free, and did they match your pre-lab plan?

2. How does this lab experiment align with real-world scenarios or challenges related to network design and VLAN configuration?

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3. How did you configure trunk ports to carry traffic for multiple VLANs?

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
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Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Lab 5: Configuration of Encapsulation dot 1Q using cisco packet tracer

Date of the Session:___/___/____ Session Time:____to_____

Learning outcome:

- Learners will learn how to configure the Encapsulation dot1Q protocol, which is used to tag VLAN information on Ethernet frames.
- Understand the importance of VLAN tagging and how it enables VLAN communication across different network devices..

Pre-Lab Task:

1. What is the purpose of encapsulation dot1Q in networking, and why is it commonly used in Ethernet networks?

2. Explain the concept of VLAN tagging and how it is achieved using encapsulation dot1Q.

3. Discuss the advantages and benefits of using encapsulation dot1Q in a network environment, such as improved scalability, flexibility, and security.

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In Lab Task:

Configuration of Encapsulation dot 1Q using cisco packet tracer

Writing space for the Problem:(For Student's use only)

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Topology Diagram

Encapsulation dot 1Q Configuration

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Output

VIVA-VOCE Questions (In-Lab):

1. What is encapsulation dot1Q, and what is its purpose in networking?
2. What is the significance of the VLAN ID in encapsulation dot1Q?
3. Explain the differences between encapsulation dot1Q and other trunking protocols, such as ISL (Inter-Switch Link).
4. How does encapsulation dot1Q support VLAN tagging and segmentation of traffic?
5. How can you remove the encapsulation dot1Q configuration from an interface if needed?

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Post Lab Task:

1. Describe the network topology you used for configuring Encapsulation dot1Q using Cisco Packet Tracer.

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2. What steps or commands did you use to enable and configure VLAN tagging?

3. Explain the purpose and significance of VLAN tagging using Encapsulation dot1Q.

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
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Lab 6: Configuration of Network address translation in Cisco packet tracer and verify the configuration

Date of the Session:___/___/____ **Session Time:____to_____**

Learning outcome:

- Learners will gain a solid understanding of Network Address Translation and its role in IP address translation between private and public networks.
- Learners will acquire hands-on experience in configuring different types of NAT in Cisco Packet Tracer.

Pre-Lab Task:

1. What is Network Address Translation (NAT), and what is its primary purpose in networking?

2. Explain the difference between static NAT and dynamic NAT. When would you use each of these NAT types?

3. What are the benefits and challenges of using NAT in a network environment?

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In Lab Task:

Configuration of Network address translation in Cisco packet tracer

Writing space for the Problem:(For Student's use only)

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Topology Diagram

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Network Address Translation Configuration

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Output

VIVA-VOCE Questions (In-Lab):

1. What is NAT, and what is its primary purpose in computer networks?
2. Explain the difference between private IP addresses and public IP addresses.
3. What is an Access Control List (ACL), and what is its primary purpose in a network?
4. How does an ACL help in controlling traffic flow in a router or a switch?
5. What are the different types of ACLs, and how do they differ in their functionality?

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Post Lab Task:

1. Describe the network topology you used for configuring Network Address Translation (NAT) in Cisco Packet Tracer. What devices were involved, and how were they interconnected?

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2. Discuss the impact of NAT on network security and addressing.

3. Describe any specific translation rules or access control policies you implemented as part of the NAT configuration.

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Lab 7: Configuration of ARP and DHCP in Cisco packet tracer and verify the configuration.

Date of the Session:___/___/____ Session Time:____to_____

Learning outcome:

- Understand the role of a router in a computer network and its importance in facilitating communication between different network segments.
- Gain familiarity with Cisco network switches and their specific features and capabilities related to router functionality and static routing.

Pre-Lab Task:

1. How does a host determine the MAC address of another host in the same network using ARP?

2. Can ARP be used between devices on different networks? Why or why not?

3. What is the function of the DHCP relay agent?

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In Lab Task:

Configuration of ARP

Writing space for the Problem:(For Student's use only)

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Topology Diagram

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
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ARP configuration

Output

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Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Configuration of DHCP.

Writing space for the Problem:(For Student's use only)

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Topology Diagram

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
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DHCP configuration

Output

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Post Lab Task:

1. What command did you use to view the ARP table on a PC or router, and what did you observe?

2. How did the ARP process behave when a device attempted to communicate with another on the same LAN for the first time?

3. What IP address range did the DHCP server assign during the lab, and how did it match the DHCP pool configuration??

4. Explain what happens step-by-step when a new host joins the network and sends a DHCP request.

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5. What entry was created in the ARP table after successful communication?

Evaluator Remark (if Any):	Marks Secured: _____out of 50
	Signature of the Evaluator with Date

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Lab 8: Configuration of Static Routing using Cisco network switch and verify the connectivity

Date of the Session:___/___/____ **Session Time:____to_____**

Learning outcome:

- Understand the role of a router in a computer network and its importance in facilitating communication between different network segments.
- Gain familiarity with Cisco network switches and Routers and their specific features and capabilities related to router functionality and static routing.

Pre-Lab Task:

1. Explain the purpose of a router in a network infrastructure. How does a router differ from other networking devices, such as switches and hubs?

2. Describe the key components and interfaces of a Huawei L3 network switch that enable routing functionality. What features or capabilities does the switch offer for routing?

4. What is static routing, and how does it differ from dynamic routing protocols? When would it be appropriate to use static routing in a network setup?

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

In Lab Task:

Cisco Router setup for Configuring Static Routing.

Writing space for the Problem:(For Student's use only)

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Topology Diagram

Course Title	**COMPUTER NETWORKS**	**ACADEMIC YEAR: 2025-26**
Course Code(s)	**24CS2202**	

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Configuration for Static Routing

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Output

Post Lab Task:

1. Describe the topology you configured using the Huawei L3 network switch and the router. What devices were connected, and what was the purpose of each device in the network?

2. Explain the concept of static routing and its significance in network environments. How did you configure static routes on the Huawei L3 network switch to enable communication between different networks?

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

3. Describe the syntax and parameters used for configuring static routes on the Huawei L3 network switch. How did you specify the destination network and the next-hop router?

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
	Signature of the Evaluator with Date

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Lab 9: Configuration of RIP and OSPF using Cisco network switch and verify the connectivity

Date of the Session:_____/___/____ **Session Time:____to_____**

Learning outcome:

- Understanding OSPF Basics and its role in dynamic routing protocols.
- Demonstrate an understanding of basic Cisco switch configuration, including accessing the command-line interface (CLI) and configuring interfaces.
- Identify and specify the OSPF router ID and Choose the OSPF network type (point-to-point, broadcast, etc.) and configure it accordingly.
- Understand the concept of hierarchical OSPF and area design**.**

Pre-Lab Task:

5. Mention the purpose and benefits of dynamic routing protocols such as RIP (Routing Information Protocol) and OSPF (Open Shortest Path First) in a network environment?

6. Ensure you have access to the required Cisco network switch (real or simulated) and a terminal emulator tool like PuTTY or SecureCRT for accessing the switch's command-line interface?

7. Clearly define the objectives of your lab, specifying what OSPF configurations you intend to implement and what outcomes you expect to achieve.

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

In Lab Task: Configuration of RIP and OSPF using Cisco network switch.

Configuring OSPF (Open Shortest Path First) on a Cisco network switch involves several steps. Here's a basic guide to help you configure OSPF and verify connectivity on a Cisco switch:

Note: OSPF is typically configured on routers rather than switches. If you are working with a Layer 3 switch, you can configure OSPF on the switch. If you are using a Layer 2 switch, you would configure OSPF on a connected router.

1. Access Switch CLI:

- Access the command-line interface (CLI) of your Cisco switch using a console cable, Telnet, or SSH.

2. Enter Global Configuration Mode:

- Enter global configuration mode by typing:

  switch> enable switch# configure terminal

3. Configure OSPF:

- Enter OSPF configuration mode and specify an OSPF process ID (e.g., 1):

  switch(config)# router ospf 1

4. Assign Router ID:

- Assign a router ID to the switch. This can be done manually or left to the system to choose. For manual assignment:

  switch(config-router)# router-id <router_id>

5. Enable OSPF on Interfaces:

- Enable OSPF on the interfaces participating in OSPF. For each interface, use:

switch(config-router)# network <network_address> <wildcard_mask> area <area_id>

6. Verify OSPF Configuration:

- Verify OSPF configuration using the following commands:

  switch# show ip ospf switch# show ip ospf interface

7. Exit Configuration Mode:

- Exit OSPF configuration mode and return to global configuration mode:

  switch(config-router)# exit

8. Save Configuration:

- Save the configuration to ensure it persists after a reboot:

  switch# write memory

9. Verify Connectivity:

- Verify OSPF connectivity by checking OSPF neighbor relationships and routing tables. Use commands such as:

  switch# show ip ospf neighbor switch# show ip route

10. Test Connectivity:

- Test connectivity between devices in different OSPF areas to ensure that OSPF is routing traffic correctly.

11. Troubleshoot if Necessary:

- If there are issues with OSPF adjacency or routing, use troubleshooting commands like:

  switch# show ip ospf interface switch# show ip ospf database

12. Monitor OSPF:

- Continuously monitor OSPF using commands such as:

  switch# debug ip ospf events switch# debug ip ospf adj

13. Disable Debugging:

- Once troubleshooting is complete, disable debugging:

  switch# undebug all

14. Save Final Configuration:

- Save the final configuration to ensure that it is persistent:

  switch# write memory

By following these steps, you can configure OSPF on a Cisco switch, verify the OSPF configuration, and ensure proper connectivity.

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Writing space for the Problem: (For Student's use only)

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Configuration for Routers	
Fast Ethernet Port Configuration & Serial Port Configuration	

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Configuration for Routers	
RIP Configuration	

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Course Code(s)	**24CS2202**	

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Output

Configuration for Routers
OSPF Configuration

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Output

Course Title	**COMPUTER NETWORKS**	**ACADEMIC YEAR: 2025-26**
Course Code(s)	**24CS2202**	

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

VIVA-VOCE Questions (In-Lab):

1. Explain what OSPF stands for and its primary purpose in networking.
2. How does OSPF differ from other routing protocols, such as RIP or EIGRP?
3. Describe the basic steps to configure OSPF on a Cisco network switch.
4. What is the OSPF router ID, and how is it determined?
5. What are OSPF areas, and why are they used in OSPF network design?

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Post Lab Task:

1. Verify the OSPF configurations to ensure that routing is functioning as expected. Use show commands to check OSPF neighbour relationships, routing tables, and routing information. Confirm that OSPF is redistributing routes correctly?

2. Differentiate the RIP and OSPF configuration by sending traffic between devices in the network to ensure that routing is working as expected?

3. Use show commands (e.g., **show ip route**) to verify that the switch's routing table includes RIP and OSPF-learned routes and that they are correct?

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
	Signature of the Evaluator with Date

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Lab 10: Configure the Standard and Extended Access Control List using cisco packet tracer

Date of the Session:_____/___/____ Session Time:____to_____

Learning outcome:

- Learn how to access and navigate Cisco Packet Tracer and Cisco IOS for configuration tasks.
- Gain hands-on experience in creating Standard ACLs using source IP addresses.
- Acquire skills in creating Extended ACLs with criteria including source and destination IP addresses, protocols, and port numbers.
- Apply Standard and Extended ACLs to network interfaces in both inbound and outbound directions.
- Understand the implications of applying ACLs in different directions on network traffic.

Pre-Lab Task:

1 What is an Access Control List (ACL), and why is it important in network security?

2 Explain the difference between Standard and Extended ACLs.

3 Describe the implicit deny rule in ACLs.

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

In Lab Task:

Configure the Standard and Extended Access Control List using cisco packet tracer

Writing space for the Problem:(For Student's use only)

Topology Diagram

Configuration of Standard Access List

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Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Output

Course Title	**COMPUTER NETWORKS**	**ACADEMIC YEAR: 2025-26**
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Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Topology Diagram

Configuration of Exxtended Access List

Course Title	**COMPUTER NETWORKS**	**ACADEMIC YEAR: 2025-26**
Course Code(s)	**24CS2202**	

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Output

Course Title	**COMPUTER NETWORKS**	**ACADEMIC YEAR: 2025-26**
Course Code(s)	**24CS2202**	

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

VIVA-VOCE Questions (In-Lab):

1. What is an Access Control List (ACL), and what is its primary purpose in a network?
2. How does an ACL help in controlling traffic flow in a router or a switch?
3. What are the different types of ACLs, and how do they differ in their functionality?

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Post Lab Task:

1. What are the primary differences between Standard and Extended ACLs?

2. Describe the steps to create a Standard ACL that permits traffic from the IP range 192.168.10.0/24.

3. Outline the process of applying an Extended ACL to block all HTTP traffic from any source to a specific server with the IP address 10.0.0.5.

4. How would you modify an existing Standard ACL to permit an additional IP address (e.g., 192.168.1.50)?

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
	Signature of the Evaluator with Date

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Lab 11: Configuration of SMTP, FTP, DNS, HTTP in Cisco packet tracer and verify the connection

Date of the Session:_____/___/____ **Session Time:____to_____**

Learning outcome:

- Learners will gain a solid understanding of SMTP, FTP, DNS, and HTTP
- Learners will acquire hands-on experience in configuring SMTP, FTP, DNS, and HTTP services using Cisco Packet Tracer.
- Understand the basic concepts of DHCP, including IP address allocation, lease duration, and the role of DHCP servers

Pre-Lab Task:

1. Give the purpose and function of SMTP (Simple Mail Transfer Protocol), DNS (Domain Name System), HTTP (Hypertext Transfer Protocol) and FTP (file Transfer Protocol) in a network environment.

2. Mention the importance of security considerations when configuring SMTP, FTP, DNS, and HTTP.

3. Discuss the interdependencies between SMTP, DNS, and HTTP in a network environment.

4. Define the scope of your DHCP implementation project. What are the specific objectives and goals you want to achieve with DHCP?

In Lab Task: Configuration of SMTP, FTP, DNS, HTTP in Cisco packet tracer

Implementation of SMTP, FTP, DNS and HTTP in Cisco packet tracer

In Cisco Packet Tracer, you can simulate the implementation of various network protocols such as SMTP (Simple Mail Transfer Protocol), FTP (File Transfer Protocol), DNS (Domain Name System), and HTTP (Hypertext Transfer Protocol) to understand how these protocols work in a network environment. Here are the general steps for implementing these protocols:

SMTP (Simple Mail Transfer Protocol):

1. Topology Setup:
    - Create a network topology in Cisco Packet Tracer with devices such as routers, switches, and PCs.
2. Device Configuration:
    - Configure an email client on a PC (e.g., Outlook) and an email server (e.g., Mail Server) on another PC.
3. SMTP Configuration:
    - On the email client, configure the SMTP settings to point to the IP address or domain name of the email server.

4. Email Testing:
    - Send test emails from the client to the server to simulate the SMTP communication.

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
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FTP (File Transfer Protocol):

1. Topology Setup:
    - Create a network topology with devices that support FTP, such as PCs or servers.
2. Device Configuration:
    - Set up an FTP server on one PC and configure an FTP client on another.
3. FTP Configuration:
    - Configure the FTP client with the server's IP address or domain.
4. File Transfer:
    - Initiate file transfers from the client to the server or vice versa to simulate FTP communication.

DNS (Domain Name System):

1. Topology Setup:
    - Create a network topology with DNS servers, client devices, and routers.
2. Device Configuration:
    - Set up a DNS server on a PC or a dedicated DNS server device. Configure client devices to use the DNS server.
3. DNS Configuration:
    - Populate the DNS server with domain names and corresponding IP addresses.
4. Name Resolution:
    - Test DNS name resolution by attempting to access websites using domain names from client devices.

HTTP (Hypertext Transfer Protocol):

1. Topology Setup:
    - Set up a network topology with web servers, client devices, and routers.
2. Device Configuration:
    - Configure a web server on a PC or a dedicated web server device. Set up web clients on other devices.
3. HTTP Configuration:
    - Populate the web server with web pages or applications.
4. Web Browsing:
    - Access web pages hosted on the server from client devices to simulate HTTP communication.

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
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General Tips:

- Router Configuration:
  - Ensure that routers are properly configured to route traffic between devices.
- Addressing:
  - Use proper IP addressing and subnetting to ensure devices can communicate within the network.
- Firewall Settings:
  - Adjust firewall settings on devices if necessary to allow traffic for the respective protocols.
- Packet Tracer Simulation:
  - Utilize Packet Tracer's simulation mode to observe the flow of packets and troubleshoot any issues.

By following these steps, you can simulate the implementation of SMTP, FTP, DNS, and HTTP in Cisco Packet Tracer, allowing you to understand how these protocols operate in a network environment.

Writing space for the Problem: (For Student's use only)

SMTP Configuration

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Topology Diagram

SMTP configuration

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Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Output

Writing space for the Problem: (For Student's use only)

FTP Configuration

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Topology Diagram

FTP configuration

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Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Output

Course Title	**COMPUTER NETWORKS**	**ACADEMIC YEAR: 2025-26**
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Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Writing space for the Problem: (For Student's use only)

DNS Configuration

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Topology Diagram

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

DNS Configuration

Output

Course Title	**COMPUTER NETWORKS**	**ACADEMIC YEAR: 2025-26**
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Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Writing space for the Problem: (For Student's use only)

HTTP Configuration

Device Configuration details

Device Name(Label)	Interface	IP Address	Subnet Mask	Default Gateway address

Topology Diagram

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Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

HTTP Configuration

Output

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Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

VIVA-VOCE Questions (In-Lab):

1. What is SMTP and FTP? Give the primary purpose?
2. How does SMTP facilitate the sending and receiving of emails?
3. What is DNS, and why is it essential for internet communication?
4. What is HTTP, and what role does it play in web communication?

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Post Lab Task:

1. Describe the network topology you used for configuring SMTP, FTP, DNS, and HTTP services in Cisco Packet Tracer. What devices were involved, and how were they interconnected?

2. Explain the purpose and significance of SMTP in the context of email communication.

3. Discuss the significance of HTTP in web communication.

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
	Signature of the Evaluator with Date

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Lab 12: Implementation of Smart home using Cisco packet tracer and verify the configuration

Date of the Session:___/___/____ **Session Time:____to_____**

Learning outcome:

- Understanding IoT Concepts and Gain a solid understanding of IoT and its applications in smart homes
- Configure Cisco routers and switches to create a functional network for the smart home.
- Learners will gain a comprehensive understanding of Smart Home technology and its applications.
- Learners will develop skills in designing network infrastructures that support Smart Home implementations

Pre-Lab Task:

1. Mention the concept of a smart home and its benefits.

2. Give some examples of devices or systems that can be incorporated into a smart home setup?

3. Discuss the importance of network infrastructure in enabling a smart home environment.

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Home Automation Basics – Beginners Guide

Although not many people can see the need for having their smart fridge connected to the Internet, most people will find the ability to remotely control lights, security cameras and other home appliances very useful. If you are thinking about adding smart devices to your home then this guide to smart homes and home automation will give you a good basic understanding of how smart devices are connected and how they are controlled.

What is Home Automation?

Home automation or **domestics** is building automation for a home, called a **smart home** or **smart house**. It involves the control and automation of lighting. Home automation is one of several areas of the IOT (internet of things), and is often called **Home IOT**.

There are three distinct levels of home automation.

1. Monitoring
2. Control
3. Automation

Monitoring

The ability to view status of systems i.e

- What is the temperature?
- Is the door locked?
- Is The Light on or off

Control

The ability to change the state of a systems i.e

- Turn up the heating.
- Lock the Door
- Turning the light on or off

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Automation

The ability to change the state of a system automatically in response to an event. i.e.

- Turn on the heating if the outside temperature falls below a certain temperature.
- Turn the lights off when no one is a home.

Currently most smart home systems are at the **control level.**

Smart Home – Automation System Components

A home automation system will consist of

- End Devices like switches, sensors ,lights, locks etc
- Connection devices like hubs and Gateways.
- A Network or networks e.g. Wi-Fi, Zigbee etc
- Internet connection – maybe optional

Local Control and Cloud Control

All homes should be able to be controlled locally from within the home. This doesn't mean that they should have manual switches, but that they should be controllable across a local network. They should also **IMO** be controllable and **fully functional** without an Internet connection. In other words if you loose the Internet connection you should still be able to turn your lights on and off. Unfortunately not all systems will operate without an Internet connection. This article is worth reading.

As a General rule of thumb **Zwave** and **Zigbee** networks and devices will operate without an Internet connection. **Wi-Fi devices** will generally **require** an Internet connection. If the device is controllable directly using a smart phone then it requires an Internet connection. This reddit discussion is worth reading.

The Role of the Cloud In Smart Homes

Many Internet devices especially **Wi-Fi devices** are dependent on an Internet connection, and cloud services to function. Generally when you set up these devices you **register them** with the manufacturer on a cloud service. They can then be controlled via an App on a smart phone, Alexa etc but will require an Internet connection to function correctly. Although these devices are easy to setup and operate they are useless without an Internet connection. IMO the Internet should represent an alternative way of controlling devices, and not the only way.

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

In Lab Task: Implementation of Smart home using Cisco packet tracer

Writing space for the Problem: (For Student's use only)

Topology Diagram

Configuration of Smart Home

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Output

Course Title	**COMPUTER NETWORKS**	**ACADEMIC YEAR: 2025-26**
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Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

VIVA-VOCE Questions (In-Lab):

1. What is a smart home, and how does it differ from a traditional home setup?
2. Explain the concept of the Internet of Things (IoT) and its role in smart home technology.
3. What communication protocols are commonly used in smart home devices, and how do they function?
4. What security considerations should be taken into account when configuring a smart home network in Packet Tracer?

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Post Lab Task:

1. Describe the network topology you used for implementing the smart home in Cisco Packet Tracer. What devices were involved, and how were they interconnected?

2. Explain the concept of a smart home and its benefits.

3. Discuss the protocols or technologies you implemented to enable communication and control within the smart home environment.

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
	Signature of the Evaluator with Date

Experiment #	<TO BE FILLED BY STUDENT>	Student ID	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	Student Name	<TO BE FILLED BY STUDENT>

Lab 13: Configuration of Basic wireless Settings SSID - LWR3000 Configure Wireless Linksys Routers using Cisco Packet Tracer.

Date of the Session:_____/___/____ **Session Time:____to_____**

Learning outcome:

- Learners will be able to identify and configure basic wireless settings such as SSID, channel, and encryption on Linksys LWR3000 routers in Cisco Packet Tracer.
- Learners will demonstrate the ability to apply wireless security protocols (e.g., WPA2) to protect a wireless network from unauthorized access.
- Learners will be able to configure wireless devices (e.g., laptops, smartphones) to connect to the configured SSID and verify network connectivity.
- Learners will develop the ability to identify and resolve basic wireless configuration errors, such as incorrect SSID, IP settings, or password mismatches, in a simulated environment.

Pre-Lab Task:

1. What is an SSID, and what role does it play in a wireless network?

2. What are the key differences between a wired and a wireless network?

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

3. What is the purpose of a wireless router like the Linksys LWR3000 in a home or office network?

In Lab Task: Configuration of Basic wireless Settings SSID - LWR3000 Configure WirelessLinksys Routers

Topology Diagram

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Configuration

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Output

VIVA-VOCE Questions (In-Lab):

1. What does SSID stand for?
2. What is the purpose of configuring an SSID in a wireless router?

Experiment #	<TO BE FILLED BY STUDENT>	**Student ID**	<TO BE FILLED BY STUDENT>
Date	<TO BE FILLED BY STUDENT>	**Student Name**	<TO BE FILLED BY STUDENT>

Post Lab Task:

1. What is the significance of changing the default SSID and password?

2. What are the key differences between WPA2-Personal and WEP security protocols?

Evaluator Remark (if Any):	**Marks Secured: _____out of 50**
	Signature of the Evaluator with Date