SCHOOL OF ENGINEERING AND TECHNOLOGY

ASSIGNMENT COVER SHEET

COURSE: NET1014 – Networking Principles

LEVEL: BCNS, BIT, BCS, BSE, BDS - Year 1

ACADEMIC SESSION: February 2025 Semester

DEADLINE: 28th Mar 2025 – 11:59PM

#	Name	Student ID	Percentage of contribution
1			
2			
3			
4			
5			

INSTRUCTIONS TO STUDENTS:

These instructions offer guidance on successfully approaching and completing the assignment. Adhering to these guidelines ensures fairness in assessment and contributes to your overall academic development.

1. Question Understanding:

The questions in this assignment are designed to test your knowledge and its practical application. Ensure you understand the essence of each question and respond appropriately.

2. Detailed Solutions:

Provide detailed and concise solutions with justifications for your choices. Include relevant information that supports your answers.

3. Visual Representation:

Enhance your explanations with diagrams and figures. A detailed diagram carries more marks, where applicable.

4. Assumptions:

Clearly state any assumptions made while answering questions and provide the reasoning behind them.

5. Critical Analysis:

To earn full credit, demonstrate analysis beyond standard class materials. Utilize knowledge from CCNA ITN course and other resources where applicable.

6. Group and Group Size:

Ensure your group consists of 4 to 6 members.

All members MUST be from the same lab group.

7. Individual Contribution Table:

For each assignment, include a table at the end of your responses indicating the percentage of involvement of each member. The ideal case is 20% for each member (5 members * 20% = 100%). If team members do not contribute equally, this percentage may vary.

8. Group Collaboration and Academic Integrity:

This is a group assignment, and collaboration within your group is encouraged. However, collaboration is strictly limited to discussions among group members. Consequently, each group must individually prepare and express their answers in their own words. Students must refrain from copying answers from other groups. In the event of identified similarities in answers or figures between groups, **zero** will be awarded to all groups involved. **Maintain academic integrity!**

9. Neatness and Clarity:

Keep your work neat and tidy with a proper flow. The clarity of your language and presentation is crucial for effective communication and, consequently, higher marks.

10. File Format:

Submit your assignment in PDF format for the written sections and in .pkt format for the Cisco Packet Tracer file. Make sure the document is well-organized and easily accessible.

12. Submission Deadline:

The submission deadline for the assignment is **March 28, 2025 (11:59PM)**.

For submission, **ONLY the group representative should emails both the PDF and .pkt files to the lab instructor.**

13. Zero Tolerance for Late Submissions:

There will be no exception to late submissions. A zero will be awarded automatically.

Good luck!

I. Comprehensive Analysis of OSI Protocol Stack (20 marks)

Task:
As a group, perform an in-depth analysis of the OSI protocol stack. Define the 7 layers and delve into the intricacies of each layer's functions and tasks. Create detailed visualizations to illustrate the relationships and interactions between layers. Additionally, provide a critical evaluation of the advantages and potential challenges associated with the OSI protocol stack. Name some well-known protocols for each layer and discuss their specific applications.

Guidelines:

- Include detailed visualizations to represent the interconnections between layers.
- Explore and discuss potential advantages and challenges of the OSI protocol stack.
- Provide real-world examples of protocols used at each layer and discuss their significance.
- Your collective answer, excluding figures, should not exceed three A4 pages.

Grading Criteria:

- Depth of analysis for each layer and critical evaluation of the protocol stack.
- Quality and complexity of visualizations showcasing inter-layer relationships.
- Thoughtful exploration of advantages and challenges.
- Inclusion of real-world examples and their relevance.

Note: This assignment is designed to challenge your group's understanding of the OSI protocol stack. Effective collaboration and thoughtful analysis will be key to achieving a comprehensive and insightful response.

II. Design and Implementation of a Network (80 marks)

Part A: Design (30 marks)

Imagine yourself as a network engineer for Sunway University tasked with designing and implementing a network connecting four labs, each with specific requirements outlined in the following table.

Lab No.	Location	Lab Name	No of hosts per lab
1	3rd floor, University Building	HUMAC	12
2	SET's new building	Communications Labs	5
3	SET's new building	Advanced Wireless Lab	7
4	SET's new building	IoT Lab	10

Due to management and security considerations, the IT department has decided to segment the network, allocating the three labs in the School of Engineering and Technology's (SET) new building to one subnet and placing HUMAC in a different subnet. The provided network address for your network is 192.168.10.0/24.

Tasks for Your Team:

1. List of Required Equipment:
- Enumerate necessary networking equipment such as switches, routers, cables, etc. Justify the need for each piece of equipment in the context of the network design.

2. Estimated Cost of Equipment:
- Break down the estimated cost of equipment, considering Cisco device prices and any additional components required for the network.

3. Physical Topology:
- Visualize the physical layout of the network, specifying the placement of switches, routers, and other equipment in each lab. Ensure the design meets the connectivity and accessibility requirements.

4. Logical Topology:
- Illustrate the logical structure of the network, emphasizing the segmentation and IP addressing scheme. Assign appropriate subnets for each lab, considering the given network address.

Note: Assume any necessary information not explicitly provided to complete your design effectively. Ensure that your design includes detailed visualizations for both the physical and logical topology.

Part B: Implementation (40 marks)

Implement the designed network in Cisco Packet Tracer, ensuring that the systems function correctly, and devices can communicate effectively. Validate the configuration and troubleshoot any issues that may arise during the implementation process.

Note: This assignment needs to be submitted in .pkt format.

Part C: Lessons Learned (10 marks)

Congratulations on completing your first network design!

Remember, with practice, you can become a master of anything!

Reflect on the challenges faced and the lessons learned throughout the assignment, such as:

Teamwork Experience:

- Share insights on how the team collaborated to achieve both design and implementation goals and effectively addressed challenges. Discuss coordination, communication, and any strategies employed to enhance teamwork.

Technical Challenges:

- Describe specific technical challenges faced during the process and elaborate on the team's approach to addressing them. This may encompass issues related to device configuration, connectivity, or any unforeseen obstacles encountered during the implementation.

Issue Resolution:

- Highlight the strategies employed to resolve technical challenges, emphasizing problem-solving techniques and the application of networking knowledge. Discuss how the team efficiently identified and mitigated issues to ensure a smooth implementation.

Overall Experience:

- Summarize the collective experience gained from the entire process of designing and implementing the network. Emphasize the practical skills acquired, detailing the most valuable takeaways. Conclude by underscoring the importance of hands-on learning in the field of networking.

Note: Keep the reflections concise and focused, ensuring all information fits within one A4 page.

~ The End ~