Computer Networks Complex Computing Problem

Complex Computing Problem:

"Designing a Basic Wired and Wireless Network for a Small Office"

CLO (Course Learning Outcomes):

Design a basic network infrastructure for a small office, integrating both wired and wireless components.

Analyze the network's performance in handling everyday office tasks and optimize for efficiency and reliability.

Computing Problem Solving Attributes:

CPA-1 (Understanding of Basic Networking Concepts): Requires foundational knowledge of wired and wireless network technologies, basic network design principles, and an understanding of common networking devices (like routers, switches, wireless access points).

CPA-2 (Practical Application): Students must apply practical networking knowledge to create a network that meets the needs of a small office environment, considering factors such as coverage, capacity, and user demands.

CPA-3 (Performance Analysis and Troubleshooting): Involves basic analysis of network performance, addressing common issues like connectivity, signal strength in wireless networks, and network security considerations.

Problem Statement:

"In a small office environment, there is a need for a reliable and efficient network that supports both wired and wireless connectivity. The challenge lies in designing a network that is cost-effective, easy to manage, and meets the daily operational needs of the office."

Problem Description:

Students will design a network for a small office, combining wired and wireless elements. The network should support typical office activities such as file sharing, internet access, and wireless connectivity for mobile devices. It should be analyzed for basic performance metrics and optimized for a small-scale environment.

Instructions:

Research and Design: Investigate the requirements of a small office network. Design a network layout that includes both wired and wireless elements.

Implementation: Use network simulation tools or actual network hardware for implementation.

Performance Analysis: Evaluate the network for basic performance metrics like connectivity, internet speed, and wireless coverage.

Optimization: Make adjustments to improve network efficiency, such as optimal placement of wireless access points or the use of network management tools.

Documentation: Document your design process, choices made, and reasons for these choices.

Presentation: Create a presentation that outlines your network design and findings.

Deliverables:

Design Report: A comprehensive document detailing the network setup, the choice of wired and wireless components, and the rationale behind the design.

Simulation Code/Network Setup: Details of the simulation or the actual network setup used.

Performance Analysis Report: An analysis of the network's performance, including strengths and areas for improvement.

Optimization Documentation: A record of steps taken to optimize the network, along with outcomes.

Presentation Slides: Slides summarizing the network design, analysis, and optimization efforts.