Department: **Computer Science**   Program: **BS**

Data Communication and Computer Networks

Announced date: 17th April, 2025   Due Date: 19th Jun, 2025   Total Marks = 10

Complex Computing Problem (CCP)		
Mapped CLO	**SDG**	**Complex Problem Solving Mapped**
CLO3	4	WP2 (Depth of analysis required) WP3 (Depth of knowledge required)

Title: Hospital Network Segmentation and Security Optimization

Problem Statement:

The objective of this project is to enhance the network performance and tighten security by logically segmenting a hospital's Local Area Network (LAN) using VLANs. Each department (e.g., Emergency, ICU, Radiology, Administration, Pharmacy) will have its own VLAN to contain broadcast domains and restrict inter-department communication unless explicitly permitted.

Simulator:

Cisco Packet Tracer will be used to simulate the design.

Given Scenario:

The hospital consists of **5 main departments** located in different parts of the building:

- Emergency
- ICU
- Radiology
- Administration
- Pharmacy

All departments are connected to a **centralized Server Room** located on the first floor. The server room hosts critical services such as:

- Electronic Health Records (EHR)
- Email Server
- Backup Server

The IP addressing scheme used is **172.16.0.0/16.**

Requirement:

1. Create VLANs for each of the following departments:
2. Emergency
3. ICU
4. Radiology
5. Administration
6. Pharmacy
7. Create a dedicated VLAN for the Server Room hosting EHR and administrative servers.
8. Devices in one department must not communicate with those in other departments (isolation by default).
9. All departments must be able to access the EHR and Email servers in the Server Room VLAN.
10. Assign a unique subnet to each VLAN using subnetting from 172.16.0.0 /16.
11. Perform Inter-VLAN routing using a Layer 3 Switch to allow selective access between VLANs (e.g., allow Admin to access Pharmacy, block others).

Deliverable:

- A comprehensive report summarizing the project, its challenges, solutions, and lessons learned.
- Presentation slides for the project demonstration
- Running Configuration of all switches
- Network Performance report

CCP Attributes mapped	
Attributes of Complex Problem Solving	**Justification**
WP1 Range of Conflicting Requirements	NA
WP2 Depth of Analysis required	In-depth Traffic Analysis is required to understand the requirement of network segmentation
WP3 Depth of Knowledge required	In-depth knowledge of network devices, IP addressing and security policies is required to solve this problem
WP4 Familiarity of issues	NA
WP5 Extent of applicable codes	NA
WP6 Extent of stakeholder involvement and level of conflicting requirements.	NA
WP7 Consequences	NA
WP8 Interdependence	NA