**Stage 3:**

Title: **The Role of SOC and SIEM in Strengthening Cybersecurity Defense.**

**- Security Operations Center (SOC)**

A Security Operations Center (SOC) is a centralized unit responsible for continuously monitoring, detecting, analyzing, and responding to cybersecurity incidents within an organization. It acts as the first line of defense against cyber threats, ensuring that security incidents are identified and mitigated promptly. The SOC team comprises security analysts, incident responders, and engineers who work collaboratively to safeguard the IT infrastructure. By leveraging advanced security tools and threat intelligence, the SOC helps minimize risks, prevent data breaches, and ensure compliance with cybersecurity standards.

**- SOC Cycle**

The SOC cycle represents the structured approach followed by SOC teams to manage and respond to security threats effectively. It consists of the following key phases:

1. **Preparation & Prevention** – Implementing security policies, setting up monitoring tools, and educating staff about cybersecurity best practices.
2. **Detection & Monitoring** – Continuously analyzing network traffic and logs to identify suspicious activities.
3. **Incident Response & Analysis** – Investigating alerts, assessing the severity of incidents, and containing threats.
4. **Mitigation & Recovery** – Neutralizing threats, patching vulnerabilities, and restoring affected systems.
5. **Post-Incident Learning & Improvement** – Documenting findings, improving security measures, and updating SOC processes based on lessons learned.

**- Security Information and Event Management (SIEM)**

SIEM (Security Information and Event Management) is a security technology that collects, analyses , and correlates log data from various sources to detect and respond to security threats. SIEM solutions help organizations gain real-time visibility into their IT environments by aggregating logs from firewalls, intrusion detection systems (IDS), endpoint security tools, and network devices.

**- SIEM Cycle**

The SIEM cycle involves a series of steps that enable efficient threat detection and management. It consists of:

1. **Data Collection** – Gathering log data from various security devices, applications, and endpoints.
2. **Normalization & Correlation** – Structuring collected data and correlating events to identify patterns.
3. **Threat Detection** – Analyzing logs to detect anomalies, suspicious activities, or known attack patterns.
4. **Alerting & Incident Response** – Generating alerts based on risk severity and initiating incident response actions.
5. **Investigation & Forensics** – Conducting in-depth analysis to understand attack methodologies.
6. **Compliance & Reporting** – Generating reports for audits, compliance, and post-incident reviews.

By implementing an effective SIEM cycle, organizations can proactively defend against cyber threats and improve security posture

**- MISP (Malware Information Sharing Platform & Threat Sharing)**

MISP is an open-source threat intelligence platform designed to facilitate the sharing, analysis, and management of cybersecurity threats. It enables organizations to collaborate on threat intelligence by exchanging indicators of compromise (IoCs), attack patterns, and security reports.

**- College Network Information**

At **DYP-ATU, Talsande**, the campus network comprises various interconnected systems, including faculty and student portals, learning management systems, research databases, and administrative servers. The network is secured using basic firewall configurations, access controls, and antivirus software. However, the increasing reliance on digital platforms and cloud services introduces security risks such as phishing attacks, unauthorized access, and malware infections. Strengthening cybersecurity infrastructure through advanced security measures like SOC and SIEM would significantly enhance network protection.

**- Deploying SOC in College Network**

Deploying a SOC at DYP-ATU would involve the following steps:

1. **Infrastructure Assessment** – Identifying critical assets, data storage points, and potential security vulnerabilities.
2. **Implementing SIEM** – Deploying a SIEM solution to collect logs from college servers, student and faculty portals, and security devices.
3. **Real-time Monitoring** – Setting up continuous threat monitoring using intrusion detection systems (IDS) and firewalls.
4. **Incident Response Plan** – Establishing a dedicated team to handle cyber incidents and conduct forensic analysis.
5. **Security Awareness Training** – Educating students and faculty about cybersecurity best practices to reduce human-related risks.

Integrating SOC in the college environment would improve network visibility, enhance threat detection, and minimize security risks.

**- Threat Intelligence**

Threat intelligence involves collecting, analyzing, and interpreting cybersecurity data to anticipate and counteract potential threats. Organizations use threat intelligence to stay ahead of cybercriminals by understanding attack trends and implementing proactive defenses.

Threat intelligence is categorized into three types:

Strategic – High-level threat reports for decision-makers.

Tactical – Analysis of attacker tactics, techniques, and procedures (TTPs).

Operational – Real-time indicators of compromise (IoCs) to respond to threats quickly.

Integrating threat intelligence into SOC and SIEM enhances an organization’s ability to detect and mitigate cyber threats effectively.

**-Incident Response**

Incident response is the process of managing and mitigating cybersecurity incidents to minimize damage and recover from attacks efficiently. An effective incident response plan (IRP) consists of:

1. Preparation – Establishing policies, training staff, and setting up response teams.

2. Detection & Analysis – Identifying incidents through SIEM alerts and log analysis.

3. Containment & Eradication – Isolating affected systems and removing threats.

4. Recovery – Restoring systems to normal operations.

**- QRadar & Understanding the Tool**

IBM QRadar is a leading SIEM solution that helps organizations detect, investigate, and respond to security threats in real time.

It provides:

1.Log Management – Aggregating security logs from multiple sources.

2.Behavioral Analytics – Detecting anomalies based on user and system behavior.

3.Automated Threat Detection – AI-driven analysis to identify potential attacks.

4.Integration with Threat Intelligence – Correlating external threat data with internal logs for enhanced security.

Understanding QRadar’s functionalities allows cybersecurity teams to effectively manage security events and mitigate risks efficiently.