**4. Aspect-Oriented Programming (AOP)**

**1. What is AOP (Aspect-Oriented Programming)?**

• **Theory**

**1.** **Overview of AOP and how it helps in separating cross-cutting concerns (e.g., logging, security, transaction management):-** AOP (Aspect-Oriented Programming) is a programming paradigm that helps separate cross-cutting concerns (like logging, security, and transaction management) from the main business logic.

Logging → Automatically log method execution without modifying business logic.

Security → Apply authentication and authorization globally.  
Transaction Management → Manage transactions centrally.  
Performance Monitoring → Measure execution time of methods.

**2. Key AOP terms: ♣ Aspect: Module encapsulating cross-cutting concerns. ♣ Advice: The action taken by an aspect (Before, After, or Around). ♣ Joinpoint: Point in the execution of the program where the aspect is applied. ♣ Pointcut: Expression that defines where the advice should be applied.**

Aspect → A module that encapsulates cross-cutting concerns like logging, security, or transactions.

Advice → The action taken by an aspect (e.g., Before, After, or Around method execution).

Joinpoint → A specific point in the execution of the program where the aspect logic is applied (e.g., method execution).

Pointcut → An expression that defines where an advice should be applied (e.g., specific methods or classes).