**📘 SDLC for Library Management System**

**✅ 1. Requirement Analysis**

In this phase, the functional and non-functional requirements of the LMS are gathered.

**Stakeholders:**

* Library Administrator
* Librarians
* Students
* Developers

**Collected Requirements:**

* Book inventory management
* User authentication and roles (Admin, Librarian, Student)
* Book issue/return with due dates
* Fine calculation for overdue books
* Report generation

**✅ 2. Feasibility Study**

The team analyzes whether the project is **technically, financially, and operationally feasible**.

**Key Outcomes:**

* Chosen technology stack: PHP/Python + MySQL
* Frontend: HTML/CSS/Bootstrap
* Moderate budget and time
* Team availability confirmed

**✅ 3. System Design**

Design the architecture, interface, database schema, and system components.

**Deliverables:**

* UML diagrams: Use Case, Class, Activity, Sequence
* ER Diagram for database
* Wireframes or mockups for UI
* Defined system modules (Admin panel, Librarian panel, Student portal)

**✅ 4. Implementation (Coding)**

Developers start writing the actual code for each module based on design documents.

**Modules:**

* Admin functionalities (manage users, books, reports)
* Librarian interface (issue/return, register student)
* Student interface (search, view issued books)
* Database connection and operations (CRUD)

**Technologies:**

* Backend: PHP, Flask/Django
* Frontend: HTML, CSS, JS, Bootstrap
* Database: MySQL/SQLite

**✅ 5. Testing**

Before deployment, the system is thoroughly tested for bugs, performance, and security.

**Types of Testing:**

* Unit Testing (test individual functions)
* Integration Testing (verify module interactions)
* System Testing (test the entire application)
* User Acceptance Testing (UAT by librarians/admins)

**✅ 6. Deployment**

Once approved, the LMS is deployed on a local server or cloud platform (e.g., XAMPP, Heroku, or custom hosting).

**Deployment Tasks:**

* Configure web server and database
* Upload source code
* Conduct final testing in live environment

**✅ 7. Maintenance**

Ongoing support is provided to fix bugs, update features, and adapt to user feedback.

**Examples:**

* Adding search filters
* Enhancing mobile responsiveness
* Backing up data periodically