[55958- Aman Goswami, Assignment-2, Date-12 Dec 2025]

Q- Develop a case study analysing the implementation of SDLC phases in a real-world engineering project. Evaluate how Requirement Gathering, Design, Implementation, Testing, Deployment, and Maintenance contribute to project outcomes.

Case Study: Smart Parking Management System for a City Mall

A software engineering team was assigned to develop a **Smart Parking Management System** for a busy shopping mall.

The goal was to reduce traffic at the entrance, help drivers find empty parking spots quickly, and provide real-time monitoring to mall management.

The project followed the **SDLC phases**, and each phase contributed directly to the project's success.

1) Requirement Gathering

The team interacted with mall authorities, security staff, and regular customers to understand real problems:

- Long queues at parking entry
- Difficulty in locating empty parking slots
- Manual ticketing causing delays
- Need for a dashboard to track space availability

They documented both **functional** requirements (slot detection, entry system, payments) and **non-functional** requirements (speed, accuracy, security).

Contribution to Outcome:

Clear requirements helped the team understand the real pain points. This prevented unnecessary features and ensured the solution matched actual user needs.

2) Design

Based on the collected requirements, the team created:

- System architecture showing sensors → server → display boards
- Database design for storing slot status and user entries

- UI design for the mobile app and admin dashboard
- Workflow diagrams for entry, exit, and payments

Contribution to Outcome:

A well-planned design acted as the **blueprint**.

It helped developers, testers, and engineers understand how all parts of the system would connect, reducing confusion and rework.

3) Implementation (Development)

The development team worked in modules:

- Sensor integration module detects empty/filled slots
- Mobile application shows real-time parking availability
- Entry/exit module handles QR-based ticket scanning
- Dashboard module displays status to mall management

Developers followed coding standards, and daily reviews were conducted to ensure quality.

Contribution to Outcome:

Implementation turned the plan into a working system.

Building in modules allowed different teams to work in parallel, which reduced development time.

4) Testing

Testing was done continuously and included:

- **Functional testing:** Does the app show correct slot status?
- **Integration testing:** Do sensors correctly update the server?
- **Performance testing:** Can the system handle heavy weekend traffic?
- **Usability testing:** Is the app simple and quick for users?

All bugs were fixed before deployment.

Contribution to Outcome:

Thorough testing ensured the system was **accurate, fast, and reliable**, especially during peak hours.

This increased user trust and reduced the chance of failures after launch.

5) Deployment

The software was installed on mall servers, and sensors were placed in every parking slot.

The mobile app was launched, and staff were trained to use the system.

Contribution to Outcome:

Deployment brought the system into real-world use, allowing customers to experience faster parking entry and easy navigation to empty spots.

6) Maintenance

After launch, the team continued to:

- Fix real-time sensor issues
- Add new features like online payment and slot reservation
- Improve app performance based on feedback
- Update security modules regularly

Contribution to Outcome:

Maintenance kept the system smooth, relevant, and updated.
Continuous improvements increased customer satisfaction and reduced complaints.

Final Evaluation

By following the SDLC phases properly:

- The mall reduced parking entry time by **40%**
- Slot availability became **99% accurate**
- Customer satisfaction increased significantly
- Management received real-time insights for decision-making