Assignment 3: Research and compare SDLC models suitable for engineering projects. Present findings on Waterfall, Agile, Spiral, and V-Model approaches, emphasizing their advantages, disadvantages, and applicability in different engineering contexts?

Comparison of SDLC Models for Engineering Projects:

- selecting an SDLC model for engineering projects it depends on the nature of the projects
- There are several software development existences cycle it has both benefits and drawbacks.

Comparison of four SDLC models:

1. **Waterfall Model**:
   The Waterfall model is a linear and sequential approach where each phase must be completed before the next phase begins.
   Phases: Requirements -> Design -> Implementation -> Testing -> Deployment -> Maintenance

   Advantages:

   - Simple to use and understand.
   - Development stages go one by one.
   - Perfect for the small projects.
   - Easy to determine the key points in the development cycle.
   - Easy to clear Task.

   Disadvantages:

   - The software is ready only after the last stage is over
   - Not the best choice for complex projects.
   - The progress of the stage is hard to measure while it is still in the development.
   - Does not give the option of identifying the problem in advance.

   Applicability:

   - Best suited for projects with well-defined requirements.
   - Good to use when the project is short

2. **Agile Model:**
   Agile is an iterative and incremental approach that emphasizes flexibility, customer collaboration, and rapid delivery of functional software.

Phases: Iterations or Sprints

Advantages:

- It is flexible risk are minimized
- Frequent interaction with customers ensures the product meets their needs.
- Early and Continuous Delivery

Disadvantages:

- The term should be highly professional.
- New requirement may conflict with the current architecture
- Less Predictable.

Applicability:

- Ideal for software development projects in dynamic environments
- Suitable for projects with evolving requirements and where rapid delivery is important.

3. **Spiral Model:**
   The Spiral model combines iterative development with systematic aspects of the Waterfall model and its mainly focus on risk analysis.
   Phases: Planning -> Risk Analysis -> Engineering -> Evaluation

   Advantages:

   - Risk Management
   - Lifecycle is divided into smaller parts.
   - Regular evaluation phases ensure customer feedback.

   Disadvantages:

   - Managing the spiral model can be complex
   - Can Increase project cost

   Applicability:

   - Suitable for large, complex, and high-risk projects.
   - When evaluating risks and cost is crucial.

4. **V-Model (Verification and Validation Model):**
   The V-Model is an extension of the Waterfall model that emphasizes verification and validation and each phase has corresponding testing phase.

Phases:

- Verification Phases: Requirements Analysis -> System Design -> Architecture Design -> Module Design.
- Validation Phases: Unit Testing -> Integration Testing -> System Testing -> Acceptance Testing.

Advantages:

- It is easy to understand and manage due to its clear, structured approach.
- Continuous validation steps ensure high-quality outputs.
- Testing and verification takes place at early stages.

Disadvantages:

- Lack of the flexibility.
- Big risks.
- Requires high documentation.

Applicability:

- Best suited for projects with clearly defined requirements where quality assurance is critical.
- Complex projects.

Applicability in Different Engineering Contexts:

1. Waterfall Model:
   - Best for projects with stable, well-defined requirements.
   - Suitable for industries.

2. Agile Model:
   - Suitable for software development in tech startups and custom software environments.
   - When it is the dynamic projects.

3. Spiral Model:
   - Suitable for large, complex projects with high risks.

4. V-Model:
   - Best for projects with well-defined requirements and a need for rigorous testing.

Choose the SDLC model based on the engineering project requirement!!!
