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.

Waterfall Model

Description: The Waterfall Model is a linear and sequential approach to software development where progress flows steadily downwards through defined phases.

Advantages:

- **Clarity:** Each phase has specific goals and deliverables.
- **Structured:** Easy to manage due to its sequential nature.
- **Documentation:** Emphasizes thorough documentation, making it easier to maintain and audit.

Disadvantages:

- **Rigidity:** Difficult to accommodate changes once a phase is completed.
- **Late Feedback:** Customer feedback typically comes late in the process.
- **High Risk:** Potential for customer dissatisfaction if initial requirements are misunderstood or incomplete.

Agile Model

Description: Agile is an iterative and incremental approach to software development, focusing on flexibility, collaboration, and continuous improvement.

Advantages:

- **Flexibility:** Allows for changes and adaptations throughout the development process.
- **Customer Collaboration:** Actively involves customers in the development process for continuous feedback.
- **Quality:** Early and frequent testing ensures high-quality deliverables.

Disadvantages:

- **Complexity:** Requires experienced team members and continuous communication.
- **Documentation:** Less emphasis on comprehensive documentation can lead to knowledge gaps.
- **Scope Management:** Requires vigilant management to prevent scope creep.

Spiral Model

Description: The Spiral Model is a risk-driven approach that combines elements of both Waterfall and Agile methodologies. It emphasizes iterative development cycles with a focus on risk management.

Advantages:

- **Risk Management:** Identifies and mitigates risks early in the development process.
- **Flexibility:** Allows for changes based on evaluation results and evolving requirements.
- **Progressive Refinement:** Continuously refines requirements and design based on feedback.

Disadvantages:

- **Complexity:** Requires expertise in risk assessment and management.
- **Cost:** Can be more expensive due to the iterative nature and potential for extended timelines.
- **Documentation:** Similar to Agile, less emphasis on extensive documentation can pose challenges.

V-Model

Description: The V-Model is a verification and validation-focused approach where each development phase is paired with a corresponding testing phase, ensuring thorough testing and validation throughout the lifecycle.

Advantages:

- **Quality Assurance:** Ensures rigorous testing at every stage, reducing defects early in the process.
- **Structured:** Provides a systematic approach to verification and validation activities.
- **Traceability:** Maintains clear mapping between requirements and testing activities.

Disadvantages:

- **Rigidity:** Less flexibility to accommodate changes once testing has begun.
- **Complexity:** Managing parallel development and testing phases can be challenging.
- **Cost:** Requires significant resources and time for testing activities.