**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:**

**Advantages:**

* + Sequential approach makes it easy to understand and manage.
  + Well-suited for projects with clear and stable requirements.
  + Each phase has specific deliverables, making progress measurable.
  + Documentation is thorough and created at each stage.

**Disadvantages:**

* + Lack of flexibility, difficult to accommodate changes once a phase is completed.
  + Testing occurs late in the process, which can lead to higher costs if errors are found.
  + Client feedback is typically not incorporated until the later stages.

**Applicability:**

Best suited for projects with well-defined requirements where changes are unlikely or costly, such as certain infrastructure projects or regulatory compliance initiatives.

**Agile Model:**

**Advantages:**

* + Highly flexible and responsive to changes.
  + Frequent iterations allow for regular feedback and adjustments.
  + Prioritizes working software over comprehensive documentation.
  + Encourages collaboration and teamwork.

**Disadvantages:**

* + Requires active involvement and commitment from stakeholders throughout the project.
  + May be challenging to implement in large-scale projects with strict regulatory requirements.
  + Continuous changes can lead to scope creep if not managed effectively.

**Applicability:**

Ideal for projects with evolving requirements or where rapid development and deployment are crucial, such as software development or product prototyping.

**Spiral Model:**

**Advantages:**

* + Incorporates risk management at each phase, reducing the likelihood of project failure.
  + Allows for iterative development and refinement.
  + Flexibility to adjust requirements and features as the project progresses.
  + Suitable for projects with high levels of uncertainty or complexity.

**Disadvantages:**

* + Can be time-consuming and costly due to its iterative nature.
  + Requires skilled personnel to effectively identify and manage risks.
  + Documentation may be less comprehensive compared to the Waterfall model.

**Applicability:**

Well-suited for large-scale projects with changing requirements or where early risk identification is critical, such as system development for aerospace or defence industries.

**V-Model:**

**Advantages:**

* + Emphasizes testing and validation throughout the development lifecycle.
  + Each stage has a corresponding testing phase, ensuring quality at each step.
  + Helps in early detection and resolution of defects.
  + Provides a structured approach with clear deliverables.

**Disadvantages:**

* + Can be rigid and less adaptable to changes.
  + May require extensive documentation and testing resources.
  + Testing activities may become time-consuming, especially in complex projects.

**Applicability:**

Suitable for projects with strict regulatory compliance requirements or where thorough testing is essential, such as medical device development or safety-critical systems engineering.