<u>Assignment 3:</u> 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.

<u>1.Waterfall Model:</u>

- **Advantages**:
  - Sequential approach with distinct phases (Requirements, Design, Implementation, Testing, Deployment) allows for easy understanding and management of the project.
  - Clear and well-defined phases make it east to understand and manage.
  - Structured approach facilities documentation and requirements gathering.
  - Well-suited for projects with stable requirements and well-defined objectives.
- **Disadvantages**:
  - Limited flexibility to accommodate changes once a phase is completed.
  - Customer feedback is often delayed until the end of the project.
  - Late discovery of defects or issues due sequential nature.
- **Applicability**:
  - Suitable for projects where requirements are clear and unlikely to change significantly, such as in construction projects or manufacturing.

<u>2.V-Model:</u>

- **Advantages**:
  - Emphasizes verification and validation activities at each stage of development, ensuring high-quality deliverables.
  - Provides a clear and structured approach to testing, with test cases directly linked to requirements.
  - Suitable for projects with strict regulatory or quality requirements.
- **Disadvantages**:
  - Sequential nature may lead to delays if issues are discovered late in the process.
  - Limited flexibility to accommodate changes in requirements.
  - Requires comprehensive upfront planning and documentation.
- **Applicability**:
  - Particularly suitable for projects with strict regulatory or quality requirements, such as medical device development or government contracts.

<u>3.Spiral Model:</u>

- **Advantages**:
  - Iterative approach combines elements of both waterfall and prototyping, allowing for risk management and incremental development.
  - Emphasizes early identification and mitigation of project risks.
  - Suitable for projects where requirements are complex. Uncertain, or likely to change.
- **Disadvantages**:
  - Complex to manage due to multiple iterations and risk analysis activities.
  - Can be time-consuming and costly, especially for smaller projects.
  - Requires a high level of expertise in risk management and iterative development.
- **Applicability**:

- Well-suited for large-scale projects with high levels of uncertainty and risk, such as complex software systems or aerospace engineering projects.

4.Agile Model:

- **Advantages**:
  - Iterative and incremental approach allows for flexibility and adaptation to changing requirements.
  - Continuous stakeholder involvement and feedback throughout the development process.
  - Faster time-to-market due to shorter development cycles (sprints).

- **Disadvantages**:
  - Requires active and experienced team members to effectively implement agile practices.
  - May lead to scope creep if not managed properly.
  - Not suitable for projects with fixed deadlines or regulatory constraints.
- **Applicability**:
  - Ideal for projects with evolving or unclear requirements, such as software development or product development in dynamic industries.

In summary, the choice of SDLC model depends on various factors including project size, complexity, requirements volatility, and industry regulations. While Waterfall and V-Model are more traditional and structured, Agile and Spiral models offer greater flexibility and adaptability, making them preferable for dynamic and evolving engineering projects.