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:Simple and easy to understand and use

Easy to manage due to the rigidity of the model. Each phase has specific, deliverables and a review process.

Phases are processed and completed one at a time.

Works well for smaller projects where requirements are very well understood.

Clearly defined stages.

Well understood milestones.

Easy to arrange tasks.

Process and results are well documented.

Disadvantages:

No working software is produced until late during the life cycle.

High amounts of risk and uncertainty.

Not a good model for complex and object-oriented projects.

Poor model for long and ongoing projects.

Not suitable for the projects where requirements are at a moderate to high risk of changing. So, risk and uncertainty is high with this process model.

It is difficult to measure progress within stages.

Cannot accommodate changing requirements.

Adjusting scope during the life cycle can end a project.

Integration is done as a "big-bang. at the very end, which doesn't allow identifying any technological or business bottleneck or challenges early.

**2. Agile Model:**Advantages:Flexibility: Embraces change throughout the development process, allowing for iterative development and adaptation to evolving requirements.Customer Collaboration: Prioritizes customer feedback and involvement, ensuring alignment with user needs and business goals.Faster Time-to-Market: Enables rapid delivery of working software through incremental development cycles.

Disadvantages:Complexity Management: Requires active project management to maintain coordination and alignment across iterations.Documentation Trade-off: While Agile values working software over comprehensive documentation, this can lead to challenges in maintaining documentation for complex projects.Resource Intensive: Requires dedicated involvement from cross-functional teams, which may not always be feasible.Applicability: Agile is well-suited for projects with dynamic requirements, high levels of uncertainty, and a focus on delivering value to customers quickly, such as in software product development, digital transformation initiatives, or startup environments.**3. Spiral Model**:Advantages:Risk Management: Iterative approach allows for early identification and mitigation of risks through multiple cycles of prototyping, evaluation, and feedback.Flexibility: Adaptable to accommodate changes in requirements or project constraints at each iteration.Incorporates Waterfall and Iterative Elements: Combines the structured phases of Waterfall with the iterative nature of Agile, offering a balanced approach.

Disadvantages:Complexity: Requires careful planning and management of iterative cycles, which can increase project overhead.Resource Intensive: Involves extensive prototyping and evaluation activities, requiring significant time and effort.Documentation Overhead: Similar to Agile, maintaining documentation can be challenging in iterative cycles.Applicability: The Spiral model is suitable for large-scale projects with complex requirements, significant technical risks, and a need for iterative development and risk management, such as in software development for critical systems or defense projects.**4. V-Model:**Advantages:Emphasis on Testing: Aligns testing activities with development phases, ensuring early validation and verification of requirements.Traceability: Provides a clear mapping between requirements, design, and testing activities, facilitating comprehensive test coverage.Predictability: Offers a structured approach similar to Waterfall, with integrated testing throughout the development lifecycle.

Disadvantages:Rigidity: Like Waterfall, changes late in the development cycle can be costly and challenging to accommodate.Complexity Management: Maintaining traceability and alignment between development and testing activities requires careful coordination.Applicability: The V-Model is suitable for projects with stringent quality requirements, where thorough testing and traceability are essential, such as in safety-critical systems development or regulated industries like healthcare or aerospace.