Assignment No. 1

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Subject: Software analysis & Design

Topic: To study software process modeling methodologies and identify their applicability to various categories of projects.

1] Introduction

When we make software, we cannot just start coding directly. There has to be a proper process to understand the problem, design the solution write the code, test it, and finally deliever it. This step-by-step approach is called a software process model.

2] Software process modeling methodologies.

a) waterfall model:

This is the oldest and most traditional way of developing software. In this model, the work is done like step-by-step, like water flowing down a waterfall. Once you finish one step, you move to next.

The Phases are: Requirements → Design → coding → Testing → Deployment → Maintainence

- where to use?
→ Best for projects where requirements do not change.
→ For ex.: billing systems, library management, government software where rules are fixed.

- Limitations: If the customer changes his mind in the middle, it is very difficult to go back.

b) Incremental model:

Instead of building the whole software at once, here we build it in small parts (increments). Each part adds more features. For ex. first release may have login, second release may add payment, third release may add reports.

- where to use?
→ Useful when requirements are big & complex
→ If the customer wants to see some working software early.
→ For ex. Banking Software, E-commerce websites

- Limitations: Needs good planning, otherwise parts may not will fit together.

c) Spiral model:

This model looks like a spiral because the project moves in repeated cycles. Each cycle has four main steps: planning, risk analysis, development, and evaluation.

After one cycle, the spiral continues with improvements.

- Where to use?

→ For every large projects where risks are high.

→ For example: Space research systems, Air traffic control software, medical devices.

- Limitations: It is costly because risk analysis takes a lot of time & experts.

d) Agile methodology.

Agile is one of the most popular modern approaches. Instead of making the whole software at once, Agile focuses on small (called sprints) Developers & customers work together closely, and after every sprint, the customer gets to see working software and give feedback.

- Where to use:

- Projects where requirements are not fixed and may change frequently.
- For ex: Mobile apps, web apps.

- Limitations: Needs active involvement of customer and skilled team members.

3.) Comparative Model:

Model	Best for	Example
1) Waterfall	small, stable projects	Library management system.
2) Incremental	Large projects with gradual delivery	Banking system
3) Spiral	High-risk, critical projects	space / aerospace projects
4) Agile	Fast-changing requirements	E-commerce website

4.) Conclusion:

No single model is perfect for all types of projects. Each methodology has its own strengths and weaknesses. If requirements are stable, waterfall or V-Model is good. If requirements keep changing, Agile or incremental works better. If the project is high-risk, spiral is suitable, and if requirements are unclear, the prototype Model is best.