

CS403 SOFTWARE ENGINEERING (RGPV)

UNIT-1 : THE SOFTWARE PRODUCT AND SOFTWARE PROCESS

Exam Focus: Agar tum sirf Unit-1 achhe se kar lo to 15–20 marks cover ho sakte hain.
Process Models, Agile aur CMM sabse important topics hain.

UNIT OVERVIEW

Why This Unit Is Important?

Ye unit Software Engineering ki foundation hai.

Isme software kaise develop hota hai aur kaunse models use hote hain ye padhaya jata hai.


Weightage

Approx: 15–20 Marks

Most Repeated Questions

 Explain Waterfall Model.

 Explain Spiral Model.

 Explain Agile Process.

🔥 Explain CMM Levels.

🔥 Compare SDLC Models.

🔥 Product Metrics vs Process Metrics.

1. SOFTWARE PRODUCT

Simple Explanation

Software Product wo final software hota hai jo customer ko deliver kiya jata hai.

Sirf program nahi balki:

- Programs
- Documentation
- User Manuals
- Procedures

sab milkar Software Product banate hain.

Exam Definition

"A software product is a complete package consisting of programs, associated documents and operational procedures delivered to users."

Example

- WhatsApp
 - Instagram
 - Google Chrome
 - ATM Software
-

Key Points

- ✓ Delivered to customer
 - ✓ Solves a problem
 - ✓ Contains documentation
-

Advantages

- Automates work
 - Saves time
 - Increases efficiency
-

Viva Questions

Q. What is a software product?

Ans. Collection of programs, documents and procedures delivered to users.

2. SOFTWARE PROCESS

Simple Explanation

Software banane ke liye follow kiye gaye steps ko Software Process kehte hain.

Definition

"A software process is a structured set of activities required to develop and maintain software."

Activities

Requirement Gathering



Analysis



Design



Coding



Testing



Maintenance

Example

Food Delivery App

1. Requirement
 2. Design
 3. Coding
 4. Testing
 5. Deployment
-

SOFTWARE PRODUCT vs SOFTWARE PROCESS

Software Product	Software Process
Final Output	Development Method
What is built	How it is built
Customer uses it	Developers follow it
Example: WhatsApp	Example: Agile

PRODUCT CHARACTERISTICS

Good software should have:

1. Reliability

Correct results.

2. Efficiency

Uses fewer resources.

3. Maintainability

Easy to modify.

4. Usability

Easy to use.

5. Portability

Works on multiple platforms.

Memory Trick

REMUP

R → Reliability

E → Efficiency

M → Maintainability

U → Usability

P → Portability

PROCESS CHARACTERISTICS

Good process should be:

- Understandable
 - Visible
 - Reliable
 - Maintainable
 - Efficient
-

SOFTWARE PROCESS MODELS



Most Important Topic

1. WATERFALL MODEL

Most Repeated

Definition

Linear sequential model where one phase must finish before next starts.

Diagram

Requirement



Analysis



Design



Coding



Testing



Maintenance

Advantages

- ✓ Simple
- ✓ Easy to understand
- ✓ Proper documentation

Disadvantages

- ✗ No flexibility
- ✗ Difficult to change requirements

Used When

Requirements are fixed.

7 Marks Question

Explain Waterfall Model with diagram.

2. PROTOTYPING MODEL

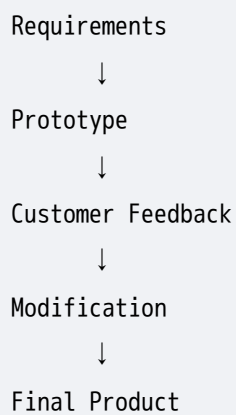
Concept

First create a sample version.

Customer checks it.

Then actual software is developed.

Diagram



Advantages

- ✓ Better understanding
 - ✓ Customer involvement
-

Disadvantages

- ✗ Cost increases
 - ✗ Time consuming
-

Example

3. RAD MODEL

RAD = Rapid Application Development

Purpose:

Develop software very quickly.

Features

- Fast development
 - User involvement
 - Reusable components
-

Advantages

- Faster delivery
 - Less development time
-

Disadvantages

- Skilled developers needed
 - Not suitable for large projects
-

4. INCREMENTAL MODEL

Very Important

Concept

Software developed in small parts.

Example

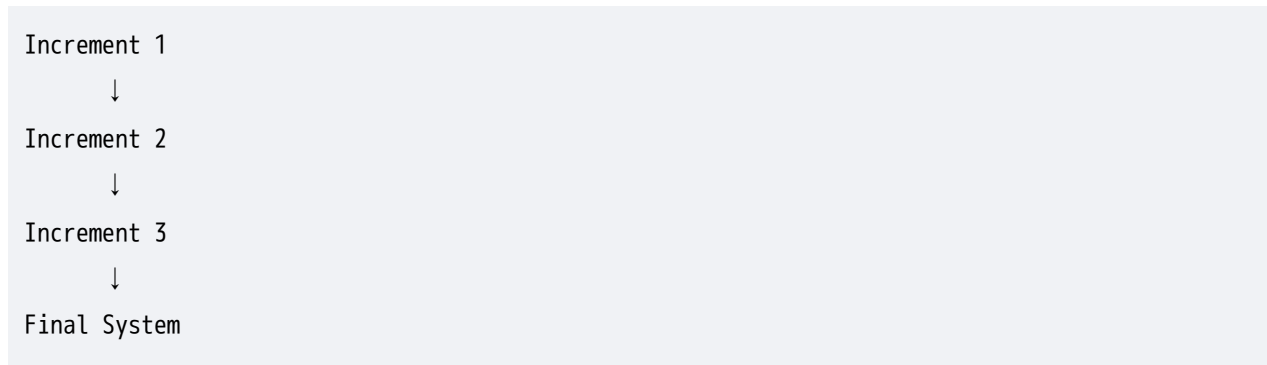
WhatsApp

Version 1 → Chat

Version 2 → Voice Call

Version 3 → Video Call

Diagram



Advantages

- ✓ Early delivery
 - ✓ Easy testing
 - ✓ Easy maintenance
-

Disadvantages

✘ Good planning required

5. SPIRAL MODEL

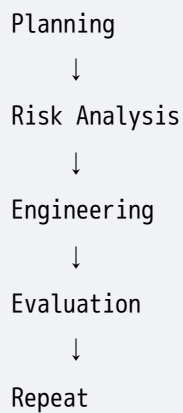
Most Important

Frequently Asked

Definition

Risk-driven software development model.

Diagram



Key Feature

Risk Analysis

Advantages

✔ Excellent risk management

✔ Suitable for large projects

Disadvantages

✗ Expensive

✗ Complex

Example

Banking System

Defense Software

Exam Question

Explain Spiral Model with diagram.

6. COMPONENT ASSEMBLY MODEL



Concept

Software developed using reusable components.

Example

Website

Login Module

Payment Module

Notification Module

Combine all modules.

Advantages

✓ Fast development

✓ Reduced cost

Disadvantages

✗ Component compatibility issues

7. RUP (Rational Unified Process)

Phases

1. Inception
 2. Elaboration
 3. Construction
 4. Transition
-

Memory Trick

IECT

I → Inception

E → Elaboration

C → Construction

T → Transition

8. AGILE PROCESS

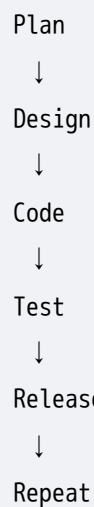
Very Important

Expected in Exam

Definition

Agile is an iterative and incremental software development approach focusing on customer collaboration and rapid delivery.

Agile Cycle



```
graph TD; Plan --> Design; Design --> Code; Code --> Test; Test --> Release; Release --> Repeat;
```

Plan
↓
Design
↓
Code
↓
Test
↓
Release
↓
Repeat

Principles

- Customer involvement
 - Continuous feedback
 - Frequent releases
 - Team collaboration
-

Advantages

- ✓ Flexible
 - ✓ Fast delivery
 - ✓ Better customer satisfaction
-

Disadvantages

- ✗ Less documentation
 - ✗ Requires skilled team
-

Example

Facebook

Instagram

Modern Web Apps

PROCESS CUSTOMIZATION

Definition

Modifying software process according to project needs.

Example

Small Project

Use Agile

Large Government Project

Use Waterfall

Advantages

- Better efficiency
 - Better project control
-

CMM (Capability Maturity Model)



Most Important

Definition

CMM measures the maturity level of software processes.

Levels

Level 5 → Optimizing

Level 4 → Managed

Level 3 → Defined

Level 2 → Repeatable

Level 1 → Initial

Memory Trick

IRDMO

I → Initial

R → Repeatable

D → Defined

M → Managed

O → Optimizing

Level 1 Initial

No process.

Level 2 Repeatable

Basic management exists.

Level 3 Defined

Standard process defined.

Level 4 Managed

Process measured and controlled.

Level 5 Optimizing

Continuous improvement.

Exam Question

Explain all CMM levels.

PRODUCT METRICS

Definition

Metrics used to measure software quality.

Examples

- LOC (Lines of Code)
 - Reliability
 - Defect Density
-

PROCESS METRICS

Definition

Metrics used to measure development process performance.

Examples

- Cost
 - Development Time
 - Productivity
-

PRODUCT METRICS vs PROCESS

METRICS

Product Metrics	Process Metrics
Measure Product	Measure Process
Quality Focus	Performance Focus
LOC	Cost
Reliability	Schedule

COMPARISON OF ALL MODELS



Model	Flexibility	Risk Handling	Cost
Waterfall	Low	Poor	Low
Prototype	Medium	Medium	Medium
RAD	High	Medium	Medium
Incremental	High	Good	Medium
Spiral	Very High	Excellent	High
Agile	Very High	Good	Medium

MOST IMPORTANT QUESTIONS FROM

UNIT-1

2 Marks

1. Define Software Product.
 2. Define Software Process.
 3. What is Agile?
 4. What is RAD?
 5. Define CMM.
-

5 Marks

1. Explain Waterfall Model.
 2. Explain Incremental Model.
 3. Explain Product Metrics.
 4. Explain Process Metrics.
-

7 Marks

1. Explain Spiral Model with diagram.
 2. Explain Agile Process.
 3. Explain CMM Levels.
 4. Explain Prototyping Model.
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10 Marks

1. Compare Software Process Models.
 2. Explain SDLC Models in detail.
 3. Waterfall vs Spiral Model.
 4. Explain Agile methodology.
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PYQ ANALYSIS (Expected 2026)

Topic	Trend	Probability
Waterfall Model	Frequently Asked	Very High
Spiral Model	Frequently Asked	Very High
Agile Process	Frequently Asked	Very High
CMM	Frequently Asked	Very High
Incremental Model	Frequently Asked	High
Product Metrics	Sometimes Asked	Medium
Process Metrics	Sometimes Asked	Medium

NIGHT BEFORE EXAM REVISION (UNIT-1)

Remember only:

- ✓ Waterfall = Sequential
- ✓ Prototype = Sample First
- ✓ RAD = Fast Development
- ✓ Incremental = Part by Part
- ✓ Spiral = Risk Analysis
- ✓ Agile = Customer Collaboration
- ✓ CMM Levels = IRDMO
- ✓ Product Metrics = Product Quality
- ✓ Process Metrics = Process Performance