CS403 SOFTWARE ENGINEERING (RGPV)

UNIT–2: REQUIREMENT ELICITATION, ANALYSIS AND SPECIFICATION

> 🎯 **Exam Target:** Unit-2 se generally 15–20 marks aate hain. SRS, Use Case Modeling, Functional vs Non-Functional Requirements sabse important topics hain.

UNIT OVERVIEW

Why This Unit Is Important?

Software Engineering me sabse pehla kaam hota hai customer ki requirements ko samajhna.

Agar requirements galat hongi to pura software fail ho sakta hai.

Weightage

⭐ Approx 15–20 Marks

Most Repeated Questions

🔥 Functional vs Non-Functional Requirements

🔥 Requirement Elicitation Techniques

🔥 Use Case Diagram

🔥 SRS (Software Requirement Specification)

🔥 Requirement Validation

🔥 Requirement Traceability

REQUIREMENT ENGINEERING PROCESS

```
Requirement Sources
        ↓
Requirement Elicitation
        ↓
Requirement Analysis
        ↓
Requirement Specification (SRS)
        ↓
Requirement Validation
        ↓
Requirement Management
```

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1. FUNCTIONAL REQUIREMENTS

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Simple Explanation

Functional Requirements batati hain ki software kya kaam karega.

Example

ATM System:

- Withdraw Money

- Deposit Money
- Check Balance
- Change PIN

Ye sab Functional Requirements hain.

Exam Definition

"Functional requirements specify the functions and services that the software system must provide."

Key Points

✅ System kya karega

✅ User-visible features

✅ Easy to test

Example

Online Shopping Website:

- User Login
- Product Search
- Add to Cart
- Payment

Advantages

- Clear functionality
- Easy development
- Easy testing

Viva Questions

Q. What is a Functional Requirement?

Ans. It specifies what the software system should do.

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2. NON-FUNCTIONAL REQUIREMENTS

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Simple Explanation

Non-Functional Requirements batati hain software kaam kaise karega.

Definition

"Non-functional requirements specify quality attributes and constraints of a software system."

Example

ATM should:

- Respond within 2 seconds
- Be secure
- Work 24×7

Types

Performance

Fast response time

Security

Protection from unauthorized access

Reliability

Works correctly every time

Usability

Easy to use

Portability

Runs on multiple platforms

Functional vs Non-Functional Requirements

⭐⭐⭐⭐⭐

Functional Requirement	Non-Functional Requirement
What system does	How system performs
Features	Quality
User functions	System attributes
Withdraw Money	Response Time
Search Product	Security

🔥 Frequently Asked 7 Marks Question

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3. REQUIREMENT SOURCES ⭐⭐⭐

Definition

Sources from which requirements are collected.

Sources

1. Customers

Main client

2. End Users

Actual users

3. Managers

Business decisions

4. Existing System

Old software

5. Documents

Reports and manuals

6. Government Rules

Legal requirements

Memory Trick

CUMEDG

Customer

User

Manager

Existing System

Documents

Government

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4. REQUIREMENT ELICITATION TECHNIQUES ⭐⭐⭐⭐⭐

Most Important Topic

Definition

Requirement Elicitation is the process of collecting requirements from stakeholders.

Techniques

1. Interview

Direct questions asked to users.

Advantages

- Detailed information
- Clear communication

Disadvantages

- Time consuming

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2. Questionnaire

Written questions.

Advantages

- Cheap
- Fast

Disadvantages

- Limited details

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3. Observation

Observe user while working.

Example

Observing bank employees.

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4. Brainstorming

Group discussion for ideas.

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5. Prototyping

Build sample software.

---

6. Workshops

Meetings with stakeholders.

Diagram

```
Stakeholders
      ↓
Requirement Gathering
      ↓
Analysis
      ↓
Documentation
```

Expected Question

Explain Requirement Elicitation Techniques.

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5. ANALYSIS MODELING ⭐⭐⭐⭐

Definition

Process of understanding and representing requirements using models.

Purpose

- Better understanding
- Better communication
- Error reduction

Types

Function-Oriented Modeling

Focus on functions

Object-Oriented Modeling

Focus on objects

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6. FUNCTION ORIENTED MODELING

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Definition

Modeling that focuses on functions performed by the system.

Tools Used

DFD (Data Flow Diagram)

ER Diagram

Example DFD

```
Customer
    ↓
Place Order
    ↓
Order Processing
    ↓
Database
```

Advantages

- Easy understanding
- Good for procedural systems

Disadvantages

- Not suitable for complex OO systems

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7. OBJECT ORIENTED MODELING

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Definition

Modeling based on objects and classes.

Example

Class: Student

Attributes:

- Name
- Roll No

Methods:

- Login()
- Register()

Diagram

```
+----------------+
|    Student     |
+----------------+
| Name           |
| Roll No        |
+----------------+
| Login()        |
| Register()     |
+----------------+
```

Advantages

- Reusability
- Easy maintenance

Disadvantages

- Complex for beginners

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8. USE CASE MODELING ⭐⭐⭐⭐⭐

Most Important Topic

Every Year Expected

Definition

Use Case Modeling describes interaction between users and the system.

Components

1. Actor

External user

Example:

Customer

Admin

Student

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2. Use Case

Function performed

Example:

Login

Withdraw Money

Search Product

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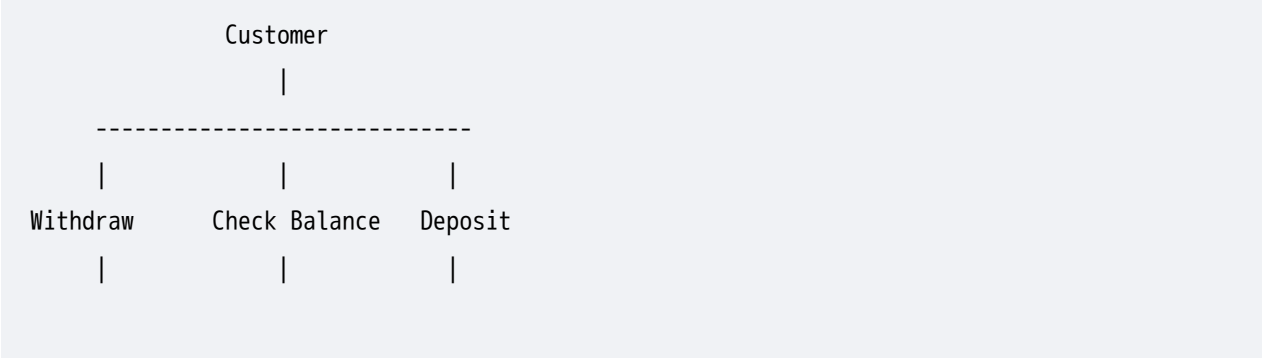
3. System Boundary

Defines system limits

Complete Use Case Diagram Explanation

ATM System Example



```
      ----------------------------
                  ATM System
```

Explanation

Actor = Customer

Use Cases:

- Withdraw Money
- Check Balance
- Deposit Money

System = ATM

Customer interacts with ATM functions.

Advantages

✅ Easy understanding

✅ User focused

✅ Better communication

Disadvantages

❌ Does not show internal logic

Viva Questions

Q. What is Actor?

Ans. External entity interacting with system.

Q. What is Use Case?

Ans. Function provided by system.

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9. SOFTWARE REQUIREMENT SPECIFICATION (SRS) ⭐⭐⭐⭐⭐

Most Important Topic

Directly Asked

Definition

"SRS is a formal document describing complete software requirements."

Purpose of SRS

- Agreement between customer and developer
- Development guide
- Testing reference

Complete SRS Format ⭐⭐⭐⭐⭐

1. Introduction

Purpose

Purpose of software

Scope

What software covers

Definitions

Important terms

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2. Overall Description

Product Perspective

Software overview

Product Functions

Main functions

User Characteristics

User information

Constraints

Limitations

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3. Specific Requirements

Functional Requirements

System functions

Non-Functional Requirements

Performance, security etc.

Interface Requirements

User Interface

Hardware Interface

Software Interface

---

4. Performance Requirements

Speed

Capacity

Response Time

---

5. Security Requirements

Authentication

Authorization

Data protection

SRS Development Flow

```
Requirement Collection
          ↓
Requirement Analysis
          ↓
SRS Document
          ↓
Development
```

Advantages of SRS

✅ Reduces misunderstanding

✅ Better planning

✅ Easier testing

✅ Better communication

Disadvantages

❌ Time consuming

❌ Frequent updates required

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10. REQUIREMENT VALIDATION

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Definition

Process of checking whether requirements are correct and complete.

Validation Questions

- Is requirement correct?
- Is requirement complete?
- Is requirement feasible?
- Is requirement testable?

Techniques

Reviews

Inspections

Prototyping

Test Case Generation

Advantages

- Error detection
- Better quality

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11. REQUIREMENT TRACEABILITY

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Frequently Asked

Definition

Ability to track requirements throughout software development lifecycle.

Purpose

- Track requirement changes
- Verify implementation
- Improve maintenance

Traceability Flow

```
Requirement
      ↓
Design
      ↓
Coding
      ↓
Testing
      ↓
Maintenance
```

Types

Forward Traceability

Requirement → Design → Code

Backward Traceability

Code → Requirement

UNIT-2 IMPORTANT QUESTIONS

2 Marks

1. Define Functional Requirement.
2. Define Non-Functional Requirement.
3. What is SRS?
4. What is Requirement Validation?
5. What is Requirement Traceability?

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5 Marks

1. Explain Requirement Sources.

2. Explain Requirement Validation.
3. Explain SRS.
4. Explain Use Case Modeling.

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7 Marks

1. Functional vs Non-Functional Requirements.
2. Explain Requirement Elicitation Techniques.
3. Explain SRS Structure.
4. Explain Requirement Traceability.
5. Explain Use Case Diagram.

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10 Marks

1. Explain Requirement Engineering Process.
2. Explain Requirement Elicitation Techniques with examples.
3. Explain SRS with suitable diagram.
4. Explain Use Case Modeling with ATM example.
5. Explain Requirement Analysis and Specification.

PYQ ANALYSIS & 2026 PREDICTION

Topic	Trend	Probability
SRS	Frequently Asked	Very High
Use Case Diagram	Frequently Asked	Very High
Functional vs Non-Functional	Frequently Asked	Very High
Requirement Elicitation	Frequently Asked	Very High
Validation	Sometimes Asked	High

Traceability	Sometimes Asked	High
Requirement Sources	Sometimes Asked	Medium

LAST NIGHT REVISION SHEET

✅ Functional Requirement = What system does

✅ Non-Functional Requirement = How system performs

✅ Requirement Sources = CUMEDG

✅ Elicitation Techniques = Interview, Questionnaire, Observation, Brainstorming, Prototype, Workshop

✅ Use Case Components = Actor, Use Case, System Boundary

✅ SRS = Complete Requirement Document

✅ Validation = Requirement Checking

✅ Traceability = Requirement Tracking