Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Summer 2025
Course Code: SE212; Course Title: Software Requirements Specification & Analysis
Sections & Teachers: MTM(A), RHH(B, K), FRR(C), RMS(D-G), KBB(H-I), NML(J), SHN(L)

Time: 1 Hour 30 Mins **Marks: 25**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

Dr. Sameera is a senior physician working at a multi-specialty hospital. The hospital recently adopted a digital Hospital Management System (HMS) to streamline its operations. One morning, she logs into the system using her secure credentials and views her daily appointments. The dashboard displays patient names, appointment times, symptoms, and assigned consultation rooms. She clicks on a patient profile, which opens the patient's medical history, lab reports, past prescriptions, and billing records. She adds notes, prescribes medicine, and schedules a follow-up. Meanwhile, the patient uses the mobile HMS app to receive updates on prescriptions, invoices, and future appointments. The pharmacy module processes the prescription and alerts the inventory manager to restock a low-supply medicine. Simultaneously, the lab technician receives a notification to perform a requested blood test. At the end of the day, the system generates analytics for the hospital administrator, showing patient flow, department efficiency, and billing summaries.The secure and integrated HMS enhances coordination among departments, reduces human error, and ensures fast service to patients while maintaining confidentiality and user-friendliness.

1.	a)	*Analyze the given scenario and **identify** the functional and non-functional requirements for the system, explaining how they support its intended functionalities and user experience.*	[Marks-4]	CLO-1 *Level-2*
	b)	***Describe** the user profile of Dr. Sameera and illustrate her smooth interaction with the HMS.*	[Marks-3]	
	c)	*Read the following scenario and identify the relevant feasibility types involved. Then, **explain** how each selected feasibility study helps assess the success of the proposed ~~airforce security~~ HMS maintenance software.*	[Marks-4]	
2.	a)	Rocket, a popular mobile financial service, is planning to redesign its transaction system to offer faster money transfers, biometric login, real-time fraud detection, and improved user experience for rural and urban users. The development team aims to collect detailed requirements from a wide range of users including agents, daily wage earners, and small shop owners. Since most users have limited technical knowledge, the company wants to ensure that their pain points and suggestions are clearly understood. The system must also ensure compatibility with low-end devices and unstable internet connections. User feedback will shape features such as transaction limit settings, language preferences, and offline notification support. ***Explain** appropriate elicitation techniques for the Rocket transaction*	[Marks-6]	CLO-2 *Level-2*

Solution of Batch 44 Summer 2025 – Mid Term

1. a) Functional and Non-Functional Requirements (HMS Scenario)

Functional Requirements : System must perform these operations like -

1. **User Authentication:** Secure login for doctors, patients, and staff using unique credentials.
2. **Appointment Management:** View, add, and schedule patient appointments.
3. **Patient Record Access:** Retrieve medical history, lab reports, and billing data.
4. **Prescription and Notes Management:** Doctors can prescribe medicines and record notes.
5. **Pharmacy & Inventory Integration:** Automatic alerts for low stock in pharmacy inventory.
6. **Lab Test Coordination:** Send test requests and notify technicians.
7. **Analytics & Reports:** Generate daily/weekly statistics for the administrator.

Non-Functional Requirements: Qualities that define system performance & experience like -

1. **Security:** Protect sensitive patient data through encryption and access control.
2. **Reliability:** Ensure uninterrupted operation for 24/7 hospital activities.
3. **Usability:** Intuitive dashboard and easy navigation for all medical staff.
4. **Performance:** Quick response time for record retrieval and updates.
5. **Scalability:** Support growing hospital departments and user load.
6. **Maintainability:** Easy to update modules like pharmacy or billing.

1.b) User Profile: Dr. Sameera

Attribute	Details
Name	Dr. Sameera
Profession	Senior Physician
Organization	Multi-specialty Hospital
Primary Role	Diagnose patients, prescribe treatments, view medical history, and manage appointments through HMS
Technical Expertise	Moderate to high — familiar with digital systems, uses secure login credentials
Language Preference	English (professional medical terminology)
Age Range	35–50 (experienced practitioner)

Attribute	Details
Work Environment	Hospital digital system (desktop) and mobile interface for quick updates
User Type	Internal stakeholder (end-user of HMS)
System Usage Frequency	Daily (throughout shifts)
Key Activities	Viewing appointments, accessing patient records, prescribing medication, scheduling follow-ups, reviewing analytics
Goals	Efficient patient management, time optimization, accurate record keeping
Pain Points	System lag, poor data visualization, or complex navigation could slow workflow
Accessibility Needs	Clear interface, easy navigation, real-time synchronization across departments

Dr. Sameera represents a *highly skilled internal user* whose interaction with the HMS requires **accuracy, security, and speed**. The system's user-friendly design enables her to deliver efficient patient care while ensuring smooth coordination across hospital units.

1.c) Feasibility Types for HMS

1. **Technical Feasibility**

- **Purpose:** Evaluates if the hospital has the necessary **hardware, software, and technical expertise** to develop and maintain the HMS.
- **Helps Success By:** Ensuring the system can handle real-time updates, secure login, and multi-module integration without system crashes or lag. It confirms that the technology infrastructure supports the hospital's operational load.

2. Operational Feasibility

- **Purpose:** Checks how well the system **meets user needs** — doctors, nurses, lab staff, and patients.
- **Helps Success By:** Making sure the HMS is **user-friendly**, easy to navigate, and actually improves hospital workflow. If staff can adapt easily, the system becomes efficient and successful in real operations.

3. **Economic Feasibility**

- **Purpose:** Analyzes the **cost-benefit** of the HMS project — including software development, maintenance, and training costs.

- **Helps Success By:** Ensuring that the system's benefits (like reduced manual errors, faster services, better patient management) **outweigh its financial costs**, making it a worthwhile investment.

4. Legal Feasibility

- **Purpose:** Ensures the HMS complies with **medical data protection laws, patient confidentiality acts, and licensing** standards.
- **Helps Success By:** Preventing **legal risks** (like data breaches or non-compliance) and ensuring the hospital operates within ethical and legal frameworks.

2. a) Elicitation Techniques for Rocket Transaction System

1. Contextual Inquiry / Field Observation: Direct observation of users performing real tasks in their natural environment (shops, kiosks, homes).

Why chosen**:** Captures real workflows, device constraints, and environmental factors that users cannot articulate.

How it gathers requirements**:** Reveals tacit behaviors (phone sharing, retry patterns on poor network, lighting conditions that affect biometrics), uncovers edge cases (power cuts, agent workarounds), and validates feasibility for low-end devices and offline modes.

2. Interviews (field-based): Guided conversations with core prompts but flexible probes.

Why chosen**:** Balances comparability (same core questions) with discovery (follow-up probes), suitable for low-literacy respondents when administered by local facilitators.

How it gathers requirements**:** Elicits pain points (transaction delays, fraud fears), preferences (language, notification methods), and acceptance of biometrics and fallback options (PIN).

3. Multi-channel Questionnaires / Surveys : Short structured questionnaires delivered via appropriate channels (SMS or USSD for low-end phones; IVR for non-literate users; paper at agent points).

Why chosen**:** Enables quantitative validation across a large, geographically dispersed user base.

How it gathers requirements**:** Measures prevalence of preferences (preferred language, typical transaction size, frequency of offline occurrences), informs transaction limit settings and prioritization.

4. Prototyping & Usability Testing: Hand-drawn wireframes or clickable prototypes tested on representative low-end devices.

Why chosen**:** Converts abstract features (biometrics flows, offline notifications) into tangible artefacts for non-technical users.

How it gathers requirements**:** Reveals UI/UX issues (font size, icon clarity, button placement), validates biometric prompts and fallback flows, helps define acceptance criteria and error-handling flows.

5. Focus Groups: Moderated group discussions with agents, shop owners, and community reps.

Why chosen**:** Agents act as hubs of tacit knowledge and can highlight operational constraints and fraud patterns.

How it gathers requirements**:** Prioritizes features (agent commissions, transaction limits), surfaces common fraud scenarios and acceptable verification steps, builds consensus for rollout strategies.

2.b) Drawbacks of alternative techniques –

1. Joint Application Development (JAD) — *Limited primary use***;** Facilitated workshops with stakeholders to define requirements collaboratively.

Drawbacks: Requires stakeholders who can attend and articulate needs; expensive; tends to capture management-level views.
Why unsuitable as primary: Rural, low-literacy end users cannot participate effectively in centralized JAD sessions; JAD risks missing contextual, field-level constraints critical to Rocket.

2. Delphi Technique (Expert Panels) — Not recommended**;** Iterative expert questionnaires aiming for consensus.

Drawbacks: Time-consuming, expert-centred, lacks direct user input.
Why unsuitable: Decision-making would be driven by experts' assumptions rather than actual user behavior (phone-sharing, intermittent connectivity), leading to blind spots in UX and offline requirements.

3. Pure Online/Web Surveys — Low priority; Surveys distributed via web forms or email.

Drawbacks: Biased toward urban, literate, smartphone users; poor reach in rural/low-end segments.
Why unsuitable: Excludes core user groups (daily wage earners, many agents) and produces non-representative data.

4. Pure Document Analysis — Supplementary only**;** Study of existing manuals, process documents, and policies.

Drawbacks: Documents describe intended processes, not actual user practices; often outdated.
Why unsuitable: Cannot reveal on-the-ground limitations (connectivity, device constraints) or users' tacit workarounds; should be used only as context.

5. Large-scale Remote Usability Testing (without field devices) — Low priority; *Remote* testing assuming stable internet and modern devices.

Drawbacks: Unrealistic for low-end devices and intermittent networks; testing environment differs from real world.
Why unsuitable: Fails to surface device- and network-specific issues critical for Rocket's target users.

6. Brainstorming (Developer/Expert-only) — Insufficient alone*;* Ideation sessions among internal teams.

Drawbacks: Prone to developer bias; generates feature ideas without user validation.
Why unsuitable: Needs to be followed by field validation; cannot substitute user engagement.

3. a) Use case diagram for Rocket transaction

System Name: *Rocket Transaction System*
Actor – 1. Primary: User (Rahim / Customer)
2. Secondary: Rocket Agent
System Admin

Use cases -

For User

- Login (via biometric or PIN)
- Transfer Money
- Check Balance
- Download Transaction Report
- Set Daily Transaction Limit
- Select Local Language
- Receive Fraud Alerts (real-time)

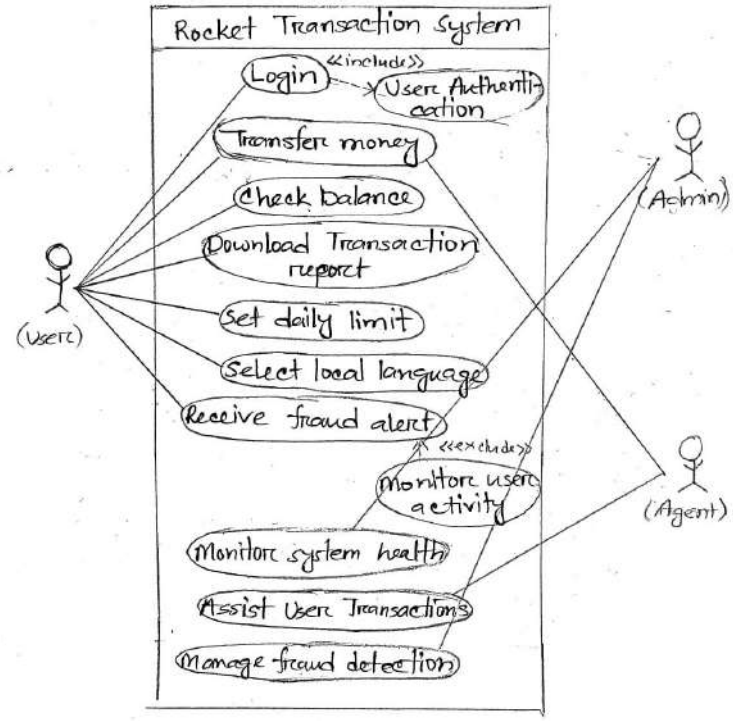
For Agent

- Cash-In
- Cash-Out
- Assist User Transactions

For System Admin

- Monitor System Health
- Monitor User Activity
- Manage Fraud Detection

*. Use case Diagram —



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Answer ALL Questions

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Anushka, a university professor, planned to attend an international conference in Singapore. With her busy schedule, she decided to book her flight through an online airline platform. One evening, she opened the app, which displayed a clean and easy-to-navigate interface. She entered her departure city, Dhaka, destination, Singapore, and travel dates. Within seconds, the app displayed available flights from different airlines, along with prices, departure times, and flight durations. After comparing options, Anushka selected a morning flight with Air Sky. The app guided her to the next step, where she entered her personal details, including her passport number, contact information, and meal preferences. Since she preferred a window seat, she selected one using the seat map feature. For additional convenience, she added extra baggage and travel insurance. Moving to the payment section, Anushka chose to pay using her credit card. The system ensured her payment was secure by encrypting her financial information. After completing the transaction, she received an email and SMS confirmation with her e-ticket and flight itinerary. On the day of her journey, Anushka used the app to check in online and download her boarding pass, saving time at the airport. She also tracked real-time flight updates to ensure her flight was on schedule. At the airport, she swiftly passed through security and found her gate. While boarding, the airline's digital system verified her ticket using a QR code, streamlining the process. After a smooth flight, she landed in Singapore and received an app notification with luggage carousel information. Throughout her experience, Anushka appreciated the system's reliability, ease of use, and real-time updates. The secure payment process, intuitive seat selection, and instant notifications made her journey stress-free, demonstrating how technology can simplify air travel from booking to arrival.

1.	a)	*Analyze the given scenario and **articulate** the functional and non-functional requirements for the system, explaining how they support its intended functionalities and user experience.*	**[Marks-6]**	**CLO-1** ***Level-2***
	b)	***Describe** the user profile of Anushka and illustrate her smooth interaction with the system.*	**[Marks-5]**	
2.	a)	***Interpret** an appropriate elicitation technique for the system described in the scenario and justify your choice with a detailed explanation of how it will effectively gather the necessary requirements.*	**[Marks-6]**	**CLO-2** ***Level-2***
	b)	***Discuss** the drawbacks of alternative elicitation techniques that you decided not to use during the requirement collection phase and explain why they were less suitable for this scenario.*	**[Marks-3]**	
3.	a)	***Draw** a use case diagram based on the air ticket booking and traveling system scenario provided. Identify key actors, use cases, and system interactions that demonstrate the process from booking a ticket to completing the journey.*	**[Marks-5]**	**CLO-3** ***Level-3***

Solution of Batch 43 Spring 2025 – Mid Term

1.a) From the scenario, some of the functional requirements are :

1. Flight Search & Comparison: Allows users to search for flights by destination, date, and compare prices and durations.
2. User Registration: Captures user information such as passport number, contact info, and preferences.
3. Seat Selection & Add-ons: Enables seat map view and selection, adding baggage or travel insurance.
4. Payment Processing: Securely encrypts payment data for online transactions.
5. Ticket Confirmation & Boarding Pass: Sends confirmation through email/SMS and enables digital boarding pass download.
6. Real-time Updates: Notifies flight status and luggage carousel information.

And some non-functional requirements are:

1. Security: Ensures data confidentiality through encryption.
2. Usability: Provides an intuitive and easy-to-navigate interface.
3. Performance: Offers fast response during flight searches and payments.
4. Reliability: Guarantees system uptime and accurate notifications.
5. Scalability: Handles high volumes of users during peak seasons.

1.b) User profile: Anushka

Attribute	Details
Name	Anushka
Profession	University Professor
Organization	University (Educator and Researcher)
Primary Role in System	Customer / End-user of the Airline Booking Platform
Age Range	30–45 years (Tech-comfortable professional)
Technical Expertise	Moderate to high — experienced with digital applications and online payments
Purpose of Use	Booking international flight, managing travel details, and receiving real-time updates
Preferred Device	Mobile app and email communication
Language	English (professional communication)
System Usage Frequency	Occasionally (only when traveling)
Goals	Book flight efficiently, ensure security of payment, receive accurate updates
Pain Points	Potential delays, complex navigation, or insecure payment system
Accessibility Needs	Clear layout, multi-step guidance, quick response, and mobile-friendly interface
User Type	External Stakeholder (customer using the service but not part of the company)

Anushka represents a **tech-savvy, professional external user** who values convenience, reliability, and security.
Her smooth interaction with the online airline system—from flight booking to arrival—reflects an **efficient, user-friendly, and secure design** that enhances overall travel experience through automation, personalization, and real-time digital communication.

2.a) Elicitation Technique for the Airline Booking System

Prototyping is a requirement elicitation technique where a **working model or sample interface** of the system is developed to help users visualize features and provide feedback before final implementation.

Justification:

- The airline booking app has many interactive features (flight search, seat selection, payment, check-in, notifications).
- Using prototypes helps users like Anushka easily understand and review system functions without needing technical knowledge.
- It ensures features such as secure payment**,** real-time updates**,** and seat maps are user-friendly and aligned with customer expectations.

How it gathers requirements:

- Users interact with the prototype to book flights, select seats, and make payments.
- Their feedback and reactions help identify missing features, design flaws, or confusing steps.
- Analysts record user suggestions and convert them into functional and non-functional requirements (e.g., ease of use, speed, security).

Prototyping allows users to experience the system early, ensuring requirements are clear, accurate**,** and user-centered. It minimizes misunderstandings and helps design a reliable, secure, and convenient airline booking system.

2. b) Drawbacks of Alternative Elicitation Techniques

1. Joint Application Development (JAD):
Drawback: Requires all stakeholders to attend long workshops.
Reason: Not suitable because busy users like professors or travelers cannot join lengthy sessions, and many user interactions are personal and app-based.

2. Questionnaire / Survey:
Drawback: Provides limited depth and lacks real-time user reactions.
Reason: In this case, users need to see and use the interface (e.g., seat map, payment flow), which surveys alone can’t capture.

3. Document Analysis:
Drawback: Depends on old manuals or system documents that may be outdated.
Reason: The system is being redesigned with new digital features; documents won’t reflect modern user experience requirements like biometric login or notifications.

4. Interview:
Drawback: Time-consuming and may not help non-technical users explain visual or interactive needs.
Reason: Users may struggle to describe interface preferences without seeing them.

Techniques like JAD, Surveys, and Document Analysis are **less suitable** because they can't effectively capture the **interactive and visual requirements** of an airline booking system. Hence, **Prototyping** is preferred for gathering accurate, user-centered requirements.

3. a) Use Case Diagram for Anushka and her air travel experience

System: Online Airline Booking and Traveling System

Actors : Primary - Passenger (Anushka)
Secondary - Airline System
Airport Security

Use Cases:

For Passenger (Anushka):
Register / Login
Search Flight
Compare Flight Options
Select Flight
Enter Passenger Details
Choose Seat (Seat Map)
Add Extra Baggage / Travel Insurance
Make Payment
Receive E-Ticket & Itinerary
Check-In Online
Download Boarding Pass
Track Flight Status
Receive Notifications (Updates / Luggage Info)

For Payment Gateway:
Process Payment
Encrypt Financial Data

For Airline System:
Confirm Booking
Verify Payment
Update Flight Information
Generate Boarding Pass
Verify Passenger QR Code at Boarding

For Airport Security System:
Scan Boarding Pass
Verify Passenger Identity

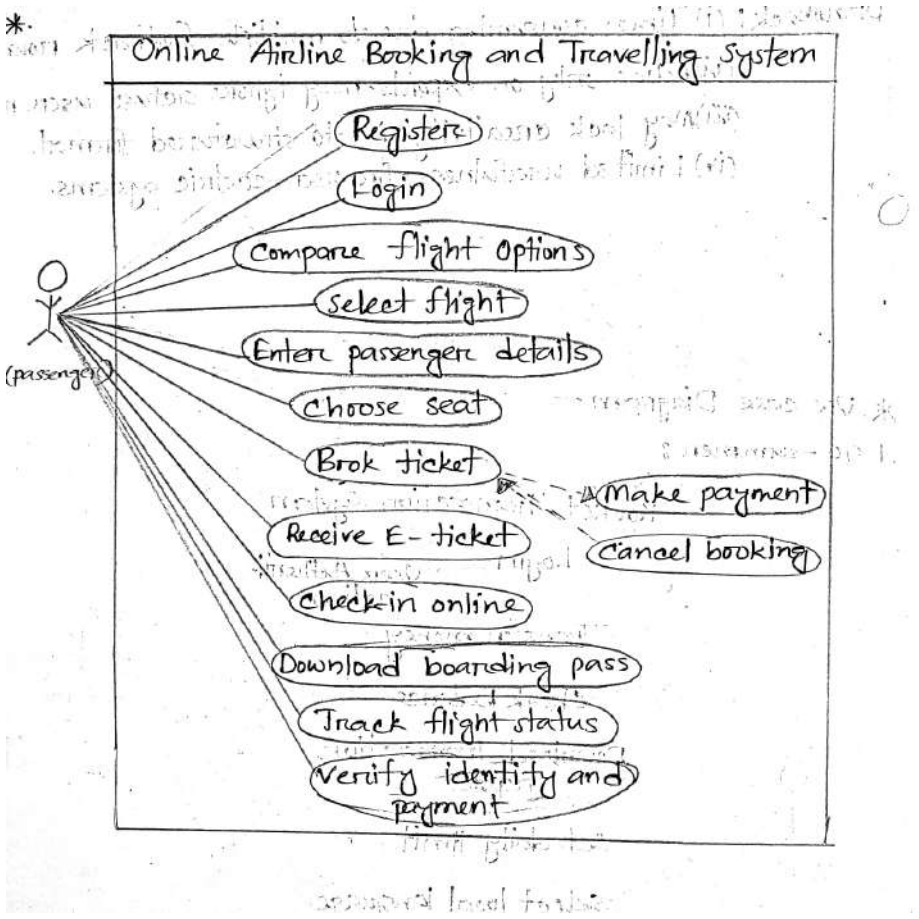

Figure: Use Case Digram for Online Airline Booking