Answer to the question number: 1

(i) Product backlog for these user stories given bellow:

User Story 1: "As a user, I want to log in securely so that I can access my account."

Design & Setup

☐ Design the log in UI (mockups & wireframes).

☐ Setup authentication routes in the backend.

Development

☐ Implement front-end log in fream (HTML, CSS, JS / React)

☐ Validate user input (email, pass etc)

☐ Implement API endpoint for authentication

☐ Integreate password hashing & storage

☐ Implement session management & token based authentication.

☐ Set up Multi-factor Auth. (MFA)

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Testing & Security:

·Deployment & Documentation.

User story 2: "As a user, I want to search for products by category to find items easi

Design & Setup:

☐ Design the search UI.
☐ Define database schema for categorie and products.

Development:

☐ Implement the front-end search bar & filter options.
☐ Develop API endpoint for product sea
☐ Optimize database queries for efficient category-based search
☐ Implement autocomplete suggestins.

Testing:

☐ Test search functionality with

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different categories.

- [ ] Measure response time for large data set

Development & Documentation:

- [ ] Deploy search feature to the testing environment
- [ ] Write API documentation for the search functionality.

(ii) Priority Assignment:

User Story 1 (Log in Securely) → High Priority

→ Essential for user access, security, and account management.

→ Needs to be implemented first before personalized features

User Story 2 (Search by category) → Medium Priority

→ Important for usability but can follow after login implementation

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Sprint Distribution:

→ Sprint 1: Implement & Test the login feature

→ Sprint 2: Develop and test the search functionality.

(iii) The development team uses a Scrum Board to track the progress of tas

To Do	In Progress	Done
Design login UI	Develop frontend login form	Validate user
Set up authentication routes	Implement API endpoint for authentication	Implement password hash
Define database schema for search	Optimize database queries	Test search categories

As tasks progress, they move from To Do →
In Progress → Done

Answer to the question no. 2

Spiral Model:

The Spiral Model explicitly focuses on risk analysis and mitigation at each phase. It divides development into iteratives cycles, where each cycle includes risk assessment, prototyping, and validation ~~be~~ before moving forward. This ensure that high-risk components are addressed early in development.

Adaptability:

Since it incorporates feedback and prototyping in every iteration, the Spiral model allows for changes based on evolving requirements

Agile methodology.

Agile manages risk by breaking developm
into short sprints, each delivering a work
product increment.
Frequent feedback from the client reduc
the risk of building something that do
meet their needs. Continous integration
testing reduce technical risks.

Adaptability

Agile thrives in environments with uncer
and evolving requirements. Since each
sprint involves reassessing priorities, i
allows for rapid changes in features or
scope.

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Extreme Programming

(i) Focus on rapid development with continuous testing and refactoring to manage risks.

(ii) Adaptable to frequent changes but requires constant client' involvement.

(iii) Works best for small teams with rapidly changing needs but may struggle with large, high-risk projects

5. best methodology for this project since the project involves both high-risks and evolving requirement, a Hybrid Approach combining. Spiral. and Agile is idea.

Answer to the question no - 3

Comparison within different models

Methodology	Predictability	Customer Collaboration	Risk management	Best for
Water fall	High	low	low	Well defined, strict deadlines
Agile	medium	High	Medium-High	Continuous Customer involvement
XP	low	Very high	medium	Small, fast moving Project and frequent change
Spiral	Medium	medium	High	High risk project, needed both risk management and adaptability

Best methodology for each project:

For Project A (well-defined & Strict deadline):
Best fit model is "Waterfall" Since the project has fixed requirements,

and a strict timeline, Waterfall ensures structured planning, clear milestones, and predictable delivery. But if you considered risk management then "Spiral" would be the best alternative.

Project B (Evolving requirements, uncertain timeline)
Best fit model is "Agile" Since agile allows for frequent iterations, continuous feedback, and adaptability to changing customers need. But if need rapid development with intense customer collaboration then "XP" would be the best alternative.

Ans to the question no 4

Software Engineering Ethics & Professiona
Responsibility.

Key Ethical Principle :-
(i) Public safety and Interest.
(ii) Integrity & Honesty.
(iii) Privacy and Security.
(iv) Fairness & Non-Discrimination
(v) Professional Competence
(vi) Accountability.

ACM/IEEE code of Ethics in
Decission-making:
(i) Prioritize Public good
(ii) Honesty and Frainess
(iii) Privacy & Security
(v) Professional integrity
(vi) Continuous Learning

The ACM/IEEE code of Ethics

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helps software engineers make ethical choices by emphasizing public good, honesty, privacy, security and continuous learning. It promotes fairness, transparency and accountability in software developments.

Ans. to the question no 5 :

Functional and Non-functional Requirements for an Airport Reservation System :

Functional Requirements :

(i) User Registration and Autentication.
(ii) Flight Search and Booking
(iii) Payment Processing.
(iv) Booking Confirmation and notification.
(v) Ticket cancellation and Refunds.

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Non-functional Requirements:

(i) Performance and Scalability

(ii) Security and Data Privacy

(iii) Availability and Reliability

(iv) Usability and Accessibility

(v) Maintainability and Upgradibility

By addressing both functional and non-functional requirements the Airport Reservation System can ensure a secure, scalable, and user friendly experience for passengers while maintaing hig reliability and efficiency.

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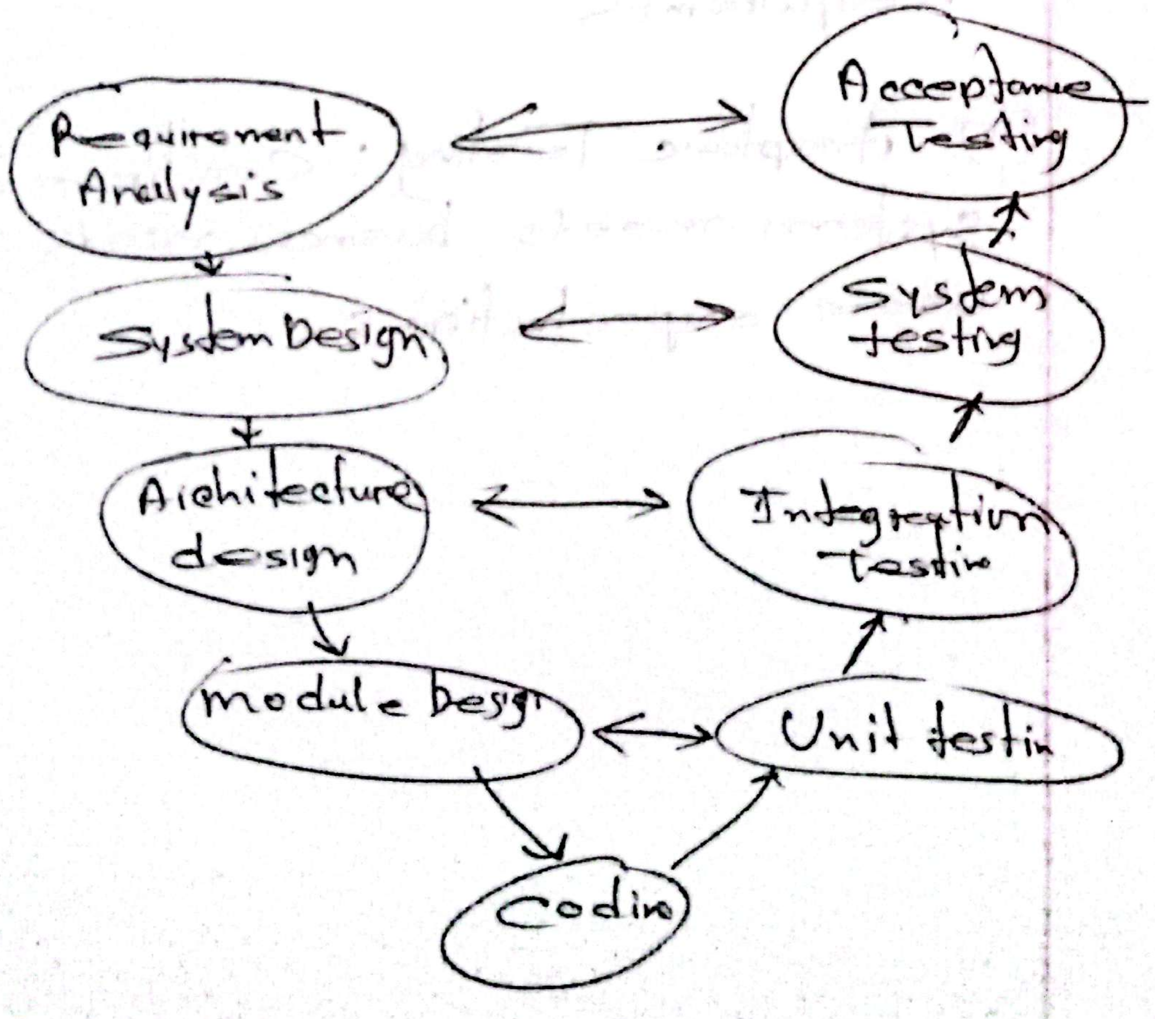
Answer to the question no- 6

The V-model (Verification and Validation Model) is sequential software development motel where each development phase has a corresponding testing phase. The model follows a "V" shape representing the relationship between development and testing/validation.



Testing Phase :

(i) Unit Testing : Verifies each module independently for correctness

(ii) Integreation Testing : Ensure modules work togethere as expected

(iii) System Testing : Validates the complete system against design reequirements .

(iv) Acceptance Testing : Confirm the system meets business needs and usere expectations .

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