SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2024-2025 (EVEN)

SET - A

ANSWER KEY

Test: FJ1 **Date: 19.02.2025**
Course Code & Title:21CSC303J - Software Engineering and Project Management **Duration: 100 minutes**
Year & Sem: III & VI **Max. Marks:** 50

Course Articulation Matrix:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	--	--	--	--	--	--	--	--	2	--	2	--
CO2	--	3	--	--	--	--	--	--	2	--	2	--

Note: CO1 : Identify the process of project life cycle model and process.
CO2 : Analyze and translate end-user requirements into system and software requirements.

Part – A (10 × 1 = 10 Marks)
Instructions: Answer all
The duration for answering part A is **15 minutes** (this sheet will be collected after 15 minutes).

Q. No	Question	Marks	BL	CO	PO	PI Code
1	A development team is following a structured approach where they first gather requirements, then design, code, and test the software. However, they realize late in the project that a critical feature is missing, leading to costly rework. Which software engineering principle could have minimized this issue? (a) Following a lightweight process (b) Early prototyping and feedback (c) Skipping documentation to save time (d) Testing only at the end of the project **Answer: (b)**	**1**	**1**	**1**	**1**	**1.2.1**
2	A government agency is developing a tax-filing system where requirements are well-defined, and strict regulatory compliance is needed. Which software development model is best suited? (a) Agile (b) Waterfall (c) Extreme Programming (XP) (d) Spiral **Answer: (b)**	**1**	**3**	**1**	**1**	**1.1.1**
3	Agile Software Development is based on _____ (a) Linear Development (b) Iterative Development	**1**	**1**	**1**	**1**	**1.2.1**

	(c) Incremental Development (d) Both Iterative & Incremental Development **Answer: (d)**					
4	A company's project manager prepares a document outlining the project's objectives, stakeholders, risks, and constraints. This document is signed by senior management to formally authorize the project. What is this document called? (a) Project scope statement (b) Project charter (c) Functional specification document (d) Risk mitigation plan **Answer: (b)**	**1**	**1**	**1**	**1**	**1.2.1**
5	In Scrum, when is a Sprint Over? (a) After completing all the Sprint Backlog Items b) After completing all the Sprint Backlog tasks (c) After completing the final testing (d) When the time box expires **Answer: (d)**	**1**	**1**	**1**	**1**	**1.2.1**
6	A retail company is developing an online shopping website. One of the requirements states, "The system must allow users to add products to their shopping cart and proceed to checkout." This is an example of: (a) Non-functional requirement (b) Functional requirement (c) User interface requirement (d) Business constraint **Answer: (b)**	**1**	**2**	**2**	**2**	**2.1.1**
7	The SRS is said to be consistent if and only if (a) its structure and style are such that any changes to the requirements can be made easily while retaining the style and structure (b) every requirement stated therein is one that the software shall meet (c) every requirement stated therein is verifiable (d) no subset of individual requirements described in it conflict with each other **Answer: (d)**	**1**	**1**	**2**	**1**	**1.2.1**
8	Which formula is correct to compute Function Point? (a) FP = [count total * 0.65] + 0.01 * sum(Fi) (b) FP = count total * [0.65 + 0.01 * sum(Fi)] (c) FP = count total * [0.65 + 0.01] * sum(Fi) (d) FP = [count total * 0.65 + 0.01] * sum(Fi) **Answer: (b)**	**1**	**4**	**2**	**1**	**1.1.1**
9	A team is developing an e-commerce system, and some customer requirements change due to new	**1**	**2**	**2**	**1**	**1.2.1**

	regulations. Which aspect of requirements engineering ensures these changes are handled systematically? (a) Requirements elicitation (b) Requirements management (c) Requirements validation (d) System specification **Answer: (b)**					
10	A software project has been estimated to require 10 person-months based on the number of lines of code and complexity factors. If a company assigns five developers to the project, what is the estimated duration of the project? (a) 2 months (b) 10 months (c) 5 months (d) 15 months **Answer: (a)**	**1**	**3**	**2**	**1**	**1.2.1**

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CO2	--	3	--	--	--	--	--	--	2	--	2	--

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Part – B (4× 5 = 20 Marks) **Instructions: Answer any four questions**						
11	A healthcare startup wants to develop a Telemedicine Application that allows patients to book virtual doctor consultations, store medical records, receive e-prescriptions, and track their health progress. The client requests that the system be available for use as soon as possible with basic consultation features, and additional functionalities can be added later based on user feedback. Interpret which software process model would be most suitable for developing the Telemedicine Application**,** considering that the client wants to release a functional version early and gradually add more features? **Answer:** The **Incremental Process Model** is the most suitable choice for this scenario. • **Early Release of Core Features** – The basic functionality (doctor consultations and appointment scheduling) can be developed and deployed first, allowing users to start using the system early. • **Client and User Feedback Integration** – Initial users can provide feedback on UI/UX, ease of booking, and consultation experience, helping improve later increments. • **Reduced Development Risks** – Since the system is built in phases, issues can be identified and fixed before expanding to more complex features like e-prescriptions and medical record storage.	**5**	**4**	**1**	**1**	**1.2.1**

<table>
<tr><td></td><td>

Flexibility to Add Features – Future increments can introduce AI-based symptom analysis, health tracking dashboards, or insurance integration based on evolving requirements.
Efficient Resource Management – Developers can focus on high-priority features first, ensuring faster delivery and better allocation of resources.

</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>12</td><td>Compare how Agile development differ from conventional development models like Waterfall?

Answer:

<table>
<tr><th>Feature</th><th>Agile Development</th><th>Conventional (Waterfall)</th></tr>
<tr><td>Flexibility</td><td>Highly flexible</td><td>Rigid and sequential</td></tr>
<tr><td>User Involvement</td><td>Continuous feedback</td><td>Minimal user involvement</td></tr>
<tr><td>Delivery</td><td>Iterative, frequent releases</td><td>One-time final release</td></tr>
<tr><td>Risk Handling</td><td>Adaptive, quick responses</td><td>Risk identified late</td></tr>
<tr><td>Best For</td><td>Dynamic projects</td><td>Fixed, well-defined projects</td></tr>
</table>
Agile is preferred for modern, complex, and evolving projects, while Waterfall is used for structured and predictable projects.</td><td>5</td><td>4</td><td>1</td><td>2</td><td>2.1.1</td></tr>
<tr><td>13</td><td>A logistics company wants to develop an AI-powered route optimization system to reduce fuel costs. Before starting development, the company wants to conduct a feasibility study. Discuss the key factors need to be considered in the feasibility study?

Answer:

The feasibility study should evaluate:

1. Technical Feasibility:
o Can AI algorithms accurately predict</td><td>5</td><td>2</td><td>2</td><td>1</td><td>1.2.1</td></tr>
</table>

	optimal delivery routes? o Does the company have the necessary infrastructure (cloud computing, GPS tracking, etc.)**?** 2. **Economic Feasibility:** o What is the estimated cost of development? o Will fuel cost savings justify the investment? 3. **Operational Feasibility:** o Will delivery personnel be able to use the new system easily**?** o Does it require training for employees**?** 4. **Legal & Compliance Feasibility:** o Does the system comply with transportation and privacy laws**?** o Are there any GDPR concerns if user data is collected? By conducting a thorough feasibility study, the company can determine whether the project is worth pursuing before committing resources.					
14	A project is in the early design phase, with an estimated size of 50 KLOC. The scale factor is 1.05, and the Effort Adjustment Factor (EAF) is 1.2. Using COCOMO , estimate the required effort. **Solution:** **Given Formula:** $$E = 2.94 \times (KLOC)^{SF} \times EAF$$ Where **SF = Scale Factor**, **EAF = Effort Adjustment Factor** 1. Convert LOC to KLOC: $$KLOC = 50$$ 2. Compute the effort: $$E = 2.94 \times (50)^{1.05} \times 1.2$$ $$= 2.94 \times 53.37 \times 1.2 = 188.5 \text{ person-months}$$ Thus, the estimated effort is **188.5 person-months**.	**5**	**2**	**2**	**2**	2.2.1
15	A mobile banking app development team is gathering requirements from customers. Some customers want advanced features like AI-based fraud detection, while others just want a simple, easy-to-use interface. Illustrate how should the team handle conflicting requirements during the elicitation and analysis process? **Answer:** 1. **Identify Stakeholder Priorities:**	**5**	**2**	**2**	**1**	1.2.1

	o Conduct surveys and interviews to find out what the majority of users prefer. 2. **Categorize Requirements:** o **Essential Features:** Account management, transaction history, secure login. o **Advanced Features:** AI fraud detection, investment recommendations. 3. **Negotiate & Find a Balance:** o Offer a basic version with essential features. o Provide premium features (like AI fraud detection) for users who need them. 4. **Prototype & Gather Feedback:** o Develop a UI prototype and test with users before finalizing features. By prioritizing key features and offering optional add-ons, the team can satisfy different user groups.					
	Part – C (2 × 10 = 20 Marks) **Instructions: Answer all**					
16	A startup is developing a food delivery app that allows users to order meals from restaurants. The team consists of developers, UI designers, and a product owner**.** The startup wants to deliver the app quickly**,** respond to customer feedback, and continuously improve the product. Demonstrate how should the team use Scrum to develop this app efficiently? **Answer:** The team can implement Scrum by following these key steps: 1. **Define the Product Backlog:** o List all features like restaurant listings, ordering system, payment integration, and tracking**.** o Prioritize based on customer needs and business goals**.** 2. **Sprint Planning:** o The team selects high-priority tasks to complete within a 2-week sprint**.** o Example Sprint 1: Develop user login and restaurant browsing features**.** 3. **Daily Scrum Meetings:** o Each day, the team holds a 15-minute stand-up to discuss progress and roadblocks. 4. **Sprint Review & Feedback:** o After each sprint, the Product Owner	**10**	**3**	**1**	**1**	**1.2.1**

	collects feedback from test users and makes adjustments. o Example: If users find checkout slow, the next sprint can focus on performance optimization**.** 5. **Sprint Retrospective:** o The team reviews what went well and what needs improvement before the next sprint. Using Scrum, the startup can quickly release a usable product and keep improving based on real user feedback**.**					
	(OR)					
17	A University wants to develop an Online Learning Platform for students to access video lectures, assignments, and discussion forums. The university hires a software development team to build the system. Define project charter and interpret what should be included in the Project Charter for this project? **Answer:** A Project Charter is a formal document that defines: • Project purpose and objectives • Stakeholders and key team members • Scope and high-level deliverables • Budget and timeline It authorizes the project and ensures everyone is aligned on expectations. The Project Charter should include: **Project Purpose & Objectives:** • To develop an online platform that enables students to access learning materials anytime. • Ensure seamless video streaming, real-time discussions, and assignment submissions. **Scope of the Project:** • Features: User authentication, course catalog, video streaming, discussion forums, and grading system. • The project does not include live one-on-one tutoring at this stage. **Stakeholders:** • University administration, students, professors,	**10**	**3**	**1**	**1**	**1.2.1**

	and the development team. **Budget & Timeline:** • Estimated budget: $100,000. • Timeline: 6 months for MVP release. **Success Criteria:** • 80% student adoption within the first semester. • Minimal technical issues and positive student feedback. By defining these key elements, the project team can stay focused and aligned on the university's goals.					
18	You are hired as a Software Engineer to develop an Online Food Ordering System for a restaurant chain. The system should allow customers to browse menus, place orders, make payments, and track deliveries. Additionally, restaurant staff should be able to manage menus and track orders, while administrators should have access to sales reports. Demonstrate the purpose of Software Requirements Specification and based on this scenario, create a detailed (SRS) document, explaining its key components with relevant examples. **Answer:** A Software Requirements Specification (SRS) document serves as a blueprint for software development. The key components of an SRS document for the Online Food Ordering System are: **1. Introduction** • **Purpose:** Defines the objective of the system. *Example:* "The Online Food Ordering System aims to allow customers to order food from a restaurant via a web or mobile application." • **Scope:** Describes the system's functionalities and stakeholders. *Example:* "The system will provide menu browsing, order placement, payment processing, and delivery tracking." • **Definitions and Acronyms:** Explains key terms like API, POS (Point of Sale), etc. **2. Overall Description** • **Product Perspective:** Specifies whether the system is standalone or integrated. *Example:* "The system integrates with third-	**10**	**3**	**2**	**1**	**1.2.1**

party payment gateways and food delivery APIs."
- **User Characteristics:** Describes expected users.
  Example: "Customers, restaurant staff, and administrators will interact with the system."
- **Assumptions and Dependencies:** Lists any technological dependencies.
  Example: "The system assumes internet connectivity for placing and tracking orders."

3. Functional Requirements

These define the core functionalities of the system:

- **User Registration and Login**
  Example: "Customers must register with an email or phone number before placing an order."
- **Menu Browsing and Selection**
  Example: "Users should be able to filter menu items by cuisine, price, and availability."
- **Order Placement and Payment**
  Example: "Customers can add items to a cart and make payments via credit card, UPI, or digital wallets."
- **Order Tracking**
  Example: "A real-time tracking system will show the status of an order from preparation to delivery."

4. Non-Functional Requirements

These specify constraints and quality attributes:

- **Performance Requirements:**
  Example: "The system should handle up to 10,000 simultaneous users without performance degradation."
- **Security Requirements:**
  Example: "All payment transactions must be encrypted using SSL/TLS."
- **Availability and Reliability:**
  Example: "The system should have 99.9% uptime with failover mechanisms."

5. External Interface Requirements

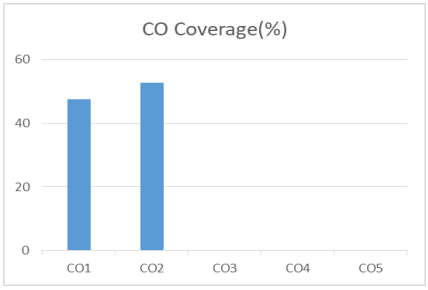
- **User Interfaces:**
  Example: "The system should have an intuitive UI with options for dark and light themes."
- **Hardware Interfaces:**
  Example: "The system should support

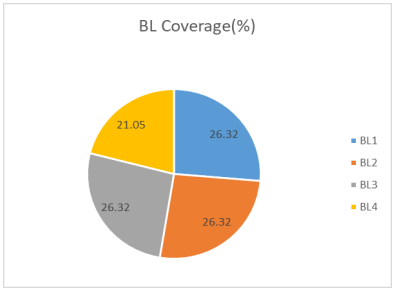
	integration with receipt printers and barcode scanners." • **Software Interfaces:** *Example:* "The system will use REST APIs to communicate with third-party payment gateways." **6. Constraints and Limitations** *Example:* "The system will initially support operations in a single country before expanding globally."					
	(OR)					
19	A company needs to develop digital signal processing software for one of its newest inventions. The software is expected to have 20000 lines of code. The company needs to determine the effort in person-months needed to develop this software using the basic COCOMO model. The multiplicative factor for this model is given as 2.2 for the software development on embedded systems, while the exponentiation factor is given as 1.50. What is the estimated effort in person-months? **Solution:** **Basic COCOMO Model,** which estimates the effort required for software development based on the number of lines of code (LOC). • **Estimated Lines of Code (LOC):** 20,000 • **Multiplicative Factor (a):** 2.2 • **Exponentiation Factor (b):** 1.50 • **Formula for Effort (E) in Basic COCOMO Model:** $E=a\times(KLOC)^b$ where **KLOC = LOC / 1000** (convert LOC to KLOC). **Step 2: Convert LOC to KLOC** KLOC=20000/1000 = 20 **Step 3: Compute the Effort** $$E = 2.2 \times (20)^{1.50}$$ First, compute $(20)^{1.5}$: $$(20)^{1.50} = 20 \times \sqrt{20} = 20 \times 4.472 = 89.44$$ Now, multiply by 2.2: $$E = 2.2 \times 89.44 = 196.77 \text{ person-months}$$	**10**	**L2**	**2**	**2**	**2.1.1**

	The estimated effort required to develop the Digital Signal Processing software is approximately 196.77 person-months using the Basic COCOMO Model.					

***Performance Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Approved by the Audit Professor/Course Coordinator