


VIT

Vellore Institute of Technology

Final Assessment Test – April 2026

 Course: **BCSE301L - Software Engineering**

 Class NBR(s): **1367/1387/1389/1390/1392/1406/1417/**
1420/1422/1424/1428/1460/1489/1499/2274/3715/
3716/4698

 Slot: **A2+TA2**

 Time: **Three Hours**

 Max. Marks: **100**

- **KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE**
- **DON'T WRITE ANYTHING ON THE QUESTION PAPER**

COs	CO Statements
CO1	Apply and assess the principles of various process models for the software development.
CO2	Demonstrate various software project management activities that include planning, Estimations, Risk assessment and Configuration Management
CO3	Perform Requirements modelling and apply appropriate design and testing heuristics to produce quality software systems.
CO4	Demonstrate the complete Software life cycle activities from requirements analysis to maintenance using the modern tools and techniques.
CO5	Escalate the use of various standards and metrics in evaluating the process and product.

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions
(10 X 10 = 100 Marks)

1. A startup company is developing a real-time patient monitoring system for hospitals, where software must continuously evolve based on medical feedback and regulatory updates. The system belongs to one of the seven software categories and must follow a defined process framework. Apply your understanding of software engineering principles to address the following: **CO1 BL3**
- I. Identify the most suitable software category for this system and justify your choice. Suggest two practical strategies to prevent software deterioration as the system undergoes frequent post-deployment changes. **[4]**
 - II. The development team plans to apply a process framework for this project. Explain how the framework activities and umbrella activities would be employed — are the umbrella activities distributed evenly across all framework activities, or concentrated at specific stages? Justify with respect to this project. **[6]**

2. A software development team is currently following a traditional waterfall approach for building a web-based banking application. The project manager is considering transitioning to Extreme Programming (XP). Analyse how the core principles of the Agile Software Development framework are embodied in XP's practices and evaluate the suitability of this transition by examining at least four XP practices in the context of the banking application's requirements. Justify your analysis with appropriate reasoning. **CO1 BL3**
3. Explain transform mapping for the SafeHome Security system project and design steps involved in it **CO3 BL2**
4. An information system is to be developed to maintain information about assets owned by a utility company such as buildings, vehicles, and equipment. It is intended that this will be updatable by staff working in the field using mobile devices as new asset information becomes available. The company has several existing asset databases that should be integrated through this system. Design a layered architecture for this asset management system. **CO3 BL4**
5. I. Apply Boundary Value Analysis (BVA) and Equivalence Class Partitioning (ECP) to design test cases for the "Transfer Funds" feature. Consider the following: **[6] CO3 BL3**
 a. Transfer amount: The transfer amount can range from \$1 to \$10,000.
 b. Account balance: The user's account balance can range from \$0 to \$15,000.
 For both BVA and ECP, design at least two test cases for each technique, clearly identifying the equivalence classes and boundary values, as well as the expected outcome for each test case.
- II. Explain how regression testing and mutation testing can be integrated in the software development process to improve the effectiveness of testing with suitable example. **[4]**
6. I. Discuss the application of object-oriented testing principles in the context of web-based systems and mobile applications. Explain briefly how testing strategies differ for these platforms. **[5] CO3 BL2**
- II. Pick one of the SafeHome system user stories to use as the basis for testing and construct a set of integration test cases needed to do integration testing for that user story. **[5]**

7. As a software project manager in a company specializing in the development of software for the offshore oil industry, you have been tasked with discovering the factors that affect the maintainability of the systems developed by your company. Discuss how you might set up a Software Configuration Management (SCM) system to analyze the maintenance process. In your answer, explain the role of baselined Software Configuration Items (SCIs), the project database, and the SCM repository in managing the maintenance process. CO4 BL3
8. Discuss the relationship between product and process metrics in software development, highlighting their role in improving quality. Evaluate the relevance of quality standards models such as ISO and TQM in driving quality management. In your answer, analyze the methods of quality management, and differentiate between Quality Control and Quality Assurance, explaining how these concepts contribute to overall quality management in software development. CO5 BL2
- 9.a) I. A company needs to develop a 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 1.5. What is the estimated effort in person-months? [5] CO2 BL3
- II. A software project has the following function point counts: 25 external inputs, 30 external outputs, 15 external inquiries, 10 internal logical files, and 8 external interface files with average weighting factor as 4, 5, 4, 10 and 7 respectively. The complexity adjustment factor is 1.15. The project also has an estimated size of 50,000 lines of code, with a development effort of 25 person-months and a defect count of 40 defects reported after delivery. Using the above data, calculate the unadjusted function point count and the adjusted function point count, determine the LOC-based productivity rate in lines of code per person-month, compute the defect density per KLOC and analyze which estimation is better. [5]

OR

- 9.b) The owner of a mid-sized bookstore chain with three branches in Chennai, currently manages sales, inventory and customer records manually across all branches, leading to frequent stock mismatches, delayed order fulfilment, and loss of loyal customers to competing online platforms. He approaches a software team to build a unified online bookstore system that supports multi-branch inventory synchronization, customer loyalty rewards, digital payments and a sales analytics dashboard — however, different branch managers have conflicting priorities, the legal team flags GST compliance concerns and the IT team warns that the existing server infrastructure cannot handle high traffic during sale seasons. CO2 BL3
- I. Analyze these concerns and classify them into appropriate risk categories. For each risk, justify your classification by explaining why it belongs to that category and what dimension of the project it threatens.
 - II. Analyze the two most critical risks from your Risk Table and construct a detailed RMMM Plan for each. In your plan, clearly distinguish between the roles of Mitigation, Monitoring, and Management — and justify why each strategy you have chosen is the most appropriate response for that specific risk in this project context.
- 10.a) For online bookstore application, CO3 BL3
- I. Identify the requirements and classify each stakeholder concern into appropriate requirement types. For each classification, justify why it belongs to that type and analyze how the misclassification of any one requirement could impact the system design. [4]
 - II. Apply two appropriate Requirements Elicitation techniques that is more suitable. [3]
 - III. Construct a structured Requirements Validation plan by incorporating two most suitable validation techniques. [3]
- OR**
- 10.b) Apply System Modelling concepts to construct a Use Case Diagram for the online bookstore system. Identify at least four actors and six use cases and demonstrate how the system model captures both the functional requirements and the relationships between actors and use cases. Additionally, the project follows an Agile development model with 2-week sprints. During Sprint 2, the legal team suddenly introduces a new GST invoice generation requirement and a branch manager request adding a book recommendation feature — both mid-sprint. Apply Requirements Management in Agile to demonstrate how the team should handle both requests, construct a prioritized product backlog entry for each, and show how sprint integrity is maintained. CO3 BL3