VIT-AP UNIVERSITY	Final Assessment Test – Winter 2024-25 Semester - May 2025	
	Maximum Marks: 100	Duration: 180 Mins
Course Code: **SWE2004**	Course Title: **Software Design and Architecture**	
Set No: 04	Exam Type : **Closed Book**	
Date: 30/04/2025	Slot: A2	School: **SCOPE**
		Session: FN

Keeping mobile phone/smart watch, even in 'off' position is treated as exam malpractice

General Instructions if any

1. **"*fx*series" -non Programmable calculator are permitted: NO**
2. **Reference tables permitted: NO**

PART – A: Answer any <u>TEN</u> Questions, Each Question Carries 10 Marks (10×10=100 Marks)

1. In the context of designing a Library Management System, what is the hierarchy of software architecture design qualities such as reliability, security, scalability, and maintainability based on their importance, and how can each of these qualities be effectively achieved through architectural and implementation strategies? **(10 M)**

2. What are cognitive dimensions in software design, and how do they influence the usability and effectiveness of software systems for both developers and end-users? Explain the key dimensions with examples, and discuss how these principles can be applied to evaluate and improve programming environments, user interfaces, or domain-specific applications. **(10 M)**

3. A cricket league is made up of at least four teams. Each team is composed of eleven players, and one player captains the team. A team has a name and a record. Players have a number and a position. All teams play games against each other. Each game has a score and a location. Teams are lead by a coach. A coach has a level of accreditation and a number of years of experience, and can coach multiple teams. Coaches and players are people, and people have names and addresses. Draw a class diagram for this information and be sure to label associations with appropriate multiplicities. **(10 M)**

4. What are the major phases of Jackson System Development (JSD), and how can this methodology be applied effectively in the design and implementation of an Online Shopping Application? List and explain each phase of the JSD approach in the context of key components of an Online Shopping Application such as user management, product catalog, shopping cart, order processing, and payment handling. **(10 M)**

5. How is Object-Oriented Design (OOD) suitable for developing a Reservation System, and what are the key benefits it brings in terms of modularity, maintainability, and scalability? Explain how the core principles of OOD can be applied to model real-world entities like users, bookings, schedules, and resources in a reservation system. **(10 M)**

6. A bank uses the following rules to classify new accounts. If a depositor's age is 21 or above and if the deposit is ` 100 or more, classify the account (type) as A. If the depositor is under 21 and the deposit is ` 100 or more, classify it as account B. If the depositor is 21 or over and the deposit is below ` 100 classify it as account C. If the depositor is under 21 and the deposit is below ` 100, do not open an account. Derive Decision rules, conditions, actions and Draw decision table for above system. **(10 M)**

7. Imagine that you are responsible for the design of a computer system that will be used to automate the definition, evaluation and examining of the academic content for a course in a university. This system should allow the syllabus, lectures, supervision exercises and examination papers to be defined in consultation with a variety of stakeholders, including students and future employers. Construct one or more UML use case diagrams and a single UML class diagram. **(10 M)**

8. Compare and contrast the major architectural styles used in software engineering. For each style, describe its structure, core components, communication mechanisms, and typical use cases. Discuss the strengths and limitations of each style in terms of modularity, scalability, performance, maintainability, and ease of testing. Finally, explain how selecting an appropriate architectural style impacts the overall quality and success of a software system. **(10 M)**

9. How do modern architectural styles such as microservices, event-driven, serverless, and cloud-native architectures differ in their structural design, and what are the merits and demerits of each in terms of scalability, deployment, complexity, and operational cost in each style? **(10 M)**

10. Illustrate and explain the different shared memory architectural styles—namely, the Repository style, Blackboard style, and Rule-Based system—by describing their structure, how they facilitate data sharing and communication among components, and by providing suitable real-world application examples for each. How does each architecture support system flexibility, modularity, and intelligent decision-making in different domains? **(10 M)**

11. What is the relationship between software design patterns and architectural patterns in software engineering, and how do they differ in terms of scope, abstraction level, and typical use cases?. How design patterns (e.g., Singleton, Observer) and architectural patterns (e.g., Client-Server, MVC) address different types of design challenges. **(10 M)**

12. Compare and contrast different types of software design patterns, such as Creational, Structural, and Behavioral patterns. Explain their core purposes, Uses, Structures and Components. How they address common problems in software design. **(10 M)**