



Mid Term (Odd) Semester Examination March 2025

Roll no.....

Name of the Course and semester: M.TECH II SEMESTER
Name of the Paper: SOFTWARE DESIGN AND ARCHITECTURE
Paper Code: MCS 252
Time: 1.5 hour

Maximum Marks: 50

Note:

- (i) Answer all the questions by choosing any one of the sub questions
- (ii) Each question carries 10 marks.

Q1. (10 Marks)

- a. Critically analyze the fundamental principles of efficient system design, emphasizing the concepts of modularity, scalability, and maintainability. Elaborate on how each principle influences system performance, reliability, and long-term sustainability. Support your discussion with relevant real-world examples and industry best practices. **CO - 1**

OR

- b. Critically analyze the interrelationship between coupling and cohesion in the context of achieving functional independence in software design. Discuss how the reduction of coupling and the enhancement of cohesion influence system maintainability, performance, and scalability. Support your analysis with theoretical frameworks, practical examples, and industry best practices? **CO - 1**

Q2. (10 Marks)

- a. What is the application of Object-Oriented Design (OOD) in contemporary software architectures, with a particular focus on Service-Oriented Architecture (SOA). Analyze how OOD principles, such as encapsulation, inheritance, and polymorphism, facilitate modularity, interoperability, and system integration. Support your answer with relevant case studies and UML diagrams. **CO - 1**

OR

- b. Write short note on
- a. Class diagrams
 - b. Collaboration diagrams
 - c. Modelling approaches in design **CO - 1**

Q3. (10 Marks)

- a) Discuss the role of conceptual, logical, and physical models in software system design. How do these models contribute to system clarity, efficiency, and maintainability? **CO - 2**

OR

- b. Explain the concept of iterative refinement in software design. How does it support the



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development of complex systems by breaking down problems into manageable components?
Illustrate with examples.

CO-2

Q4.

(10 Marks)

- a) Discuss the importance of user research in UX design. How do techniques such as user interviews, surveys, and usability testing help designers create more intuitive and user-friendly systems?

CO - 2

OR

- b) Critically analyze the significance of performance metrics in system design. Discuss how key metrics such as response time, throughput, and resource utilization contribute to evaluating and optimizing system efficiency, scalability, and reliability.

CO - 2

Q5.

(10 Marks)

- a. Design a comprehensive class diagram for an online course management system used by a university. The system should include functionalities for course creation, student enrollment, assignment submissions, and grade management. Ensure that your diagram represents key classes such as Course, Student, Instructor, Assignment, and Grade, along with their attributes, methods, and relationships (association, inheritance, and aggregation). Clearly indicate multiplicities and access modifiers where applicable.

CO -1

OR

- b. Explain the significance of responsive design in the development of mobile applications. Analyze how designers can ensure seamless and consistent user experiences across diverse screen sizes, resolutions, and device types.

CO - 2