

**Savitribai Phule Pune University**  
**Fourth Year of Computer Engineering (2019 Course)**  
**310254(D): Software Modelling and Architecture**

<b>Teaching Scheme:</b>	<b>Credit</b>	<b>Examination Scheme:</b>
<b>TH:03Hours/Week</b>	<b>03</b>	<b>In-Sem (Paper): 30 Marks</b>
		<b>End-Sem (Paper): 70 Marks</b>

**Prerequisites Courses:** Object Oriented Programming (210243), Software Engineering (210253)

**Companion Course:** Laboratory Practice II (310258)

**Course Objectives:**

- To understand and apply Object Oriented concept for designing Object Oriented based model
- To transform Requirement document to appropriate design
- To acquaint with the interaction between quality attributes and software architecture. To understand different architectural designs, transform them into proper model and document them.
- To understand software architecture with case studies and explore with examples, use of design pattern application

**Course Outcomes:**

On completion of the course, learners should be able to

- CO1: Analyze the problem statement (SRS) and choose proper design technique for designing web-based/ desktop application
- CO2: Design and analyze an application using UML modeling as fundamental tool
- CO3: Evaluate software architectures
- CO4: Use appropriate architectural styles and software design patterns
- CO5: Apply appropriate modern tool for designing and modeling

## Course Contents

### Unit I Concepts of Software Modelling 07 Hours

**Software Modelling:** Introduction to Software Modelling, Advantages of modelling, Principles of modelling. **Evolution of Software Modeling and Design Methods:** Object oriented analysis and design methods, Concurrent, Distributed Design Methods and Real-Time Design Methods, Model Driven Architecture (MDA), 4+1 Architecture, Introduction to UML, UML building Blocks, COMET Use Case–Based Software Life Cycle. **Requirement Study:** Requirement Analysis, SRS design, Requirements Modeling. **Use Case:** Actor and Use case identification, Use case relationship (Include, Extend, Use case Generalization, Actor Generalization), Use case template.

### Unit II Static Modelling 07 Hours

Study of classes (analysis level and design level classes). **Methods for identification of classes:** RUP (Rational Unified Process), CRC (Class, Responsibilities and Collaboration), Use of Noun Verb analysis (for identifying entity classes, controller classes and boundary classes). **Class Diagram:** Relationship between classes, Generalization/Specialization Hierarchy, Composition and Aggregation Hierarchies, Associations Classes, Constraints.

### Unit III Dynamic Modelling 07 Hours

**Activity diagram:** Different Types of nodes, Control flow, Activity Partition, Exception handler, Interruptible activity region, Input and output parameters, Pins.

**Interaction diagram:** Sequence diagram, Interaction Overview diagram, State machine diagram, Advanced State Machine diagram, Communication diagram, Timing diagram.

### Unit IV Software Architecture and Quality Attributes 07 Hours

Introduction to Software Architecture, Importance of Software Architecture, Architectural Structure and Views. **Architectural Pattern:** common module, Common component-and-connector, Common allocation.

**Quality Attributes:** Architecture and Requirements, Quality Attributes and Considerations

### Unit V Architectural Design and Documentation 07 Hours

**Architecture in the Life Cycle:** Architecture in Agile Projects, Architecture and Requirements, Designing an Architecture. **Documenting Software Architecture:** Notations, Choosing and Combining views, Building the documentation Package, Documenting Behavior, Documenting Architecture in an Agile Development Project.

### Unit VI Design Patterns 07 Hours

**Design Patterns:** Introduction, Different approaches to select Design Patterns. **Creational patterns:** Singleton, Factory, Structural pattern: Adapter, Proxy. **Behavioral Patterns:** Iterator, Observer Pattern with applications.

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**Department of Computer Engineering**

## TEACHING PLAN

**Academic Year: 2024-25(Semester: VI)**

Course Title: Software Modelling and Architecture		Subject Code: 310254(D)	Class: T.E.	Division: B	
Term: I	Date of commencement of classes:		Date of conclusion of teaching:		
Lecture Schedule:  3Hrs/ Week	Practical/Tutorial Schedule:  2Hrs/Week	Examination Scheme			
		Theory:100 M  In Sem:30 M (1 Hr)  End Sem: 70(2Hrs.30 min.)	Term Work	Practical	Oral
			50	25	-
Subject Teacher	Mrs. Manisha Desai	Previous 3 Years University Result	2021-22	2022-23	2023-24
			97%	90%	

UNIT – I: Concepts of Software Modelling					
<b>Syllabus: Software Modelling:</b> Introduction to Software Modelling, Advantages of modelling, Principles of modelling. <b>Evolution of Software Modeling and Design Methods:</b> Object oriented analysis and design methods, Concurrent, Distributed Design Methods and Real-Time Design Methods, Model Driven Architecture (MDA), 4+1 Architecture, Introduction to UML, UML building Blocks, COMET Use Case–Based Software Life Cycle. <b>Requirement Study:</b> Requirement Analysis, SRS design, Requirements Modeling. <b>Use Case:</b> Actor and Use case identification, Use case relationship (Include, Extend, Use case Generalization, Actor Generalization), Use case template.					
PLAN			ACTUAL		
Lect. No.	Date	Topics	Date	Topics covered	Reasons for Deviation
1		Introduction to Software Modelling, Advantages of modelling, Principles of modelling			
2		<b>Evolution of Software Modeling and Design Methods:</b> Object oriented analysis and design methods, Concurrent			
3		Distributed Design Methods and Real-Time Design Methods, Model Driven Architecture (MDA)			
4		4+1 Architecture, Introduction to UML, UML building Blocks, COMET Use Case–Based Software Life Cycle.			
5		<b>Requirement Study:</b> Requirement Analysis, SRS design, Requirements Modeling. <b>Use Case:</b> Actor and Use case identification			
6		, Use case relationship (Include, Extend, Use case Generalization			
7		, Actor Generalization), Use case template.			
Make up Classes					
Contents Beyond syllabus					
		Solved Gate base Question			

UNIT –II: Static Modelling					
<b>Syllabus:</b> Study of classes (analysis level and design level classes). <b>Methods for identification of classes:</b> RUP (Rational Unified Process), CRC (Class, Responsibilities and Collaboration), Use of Noun Verb analysis (for identifying entity classes, controller classes and boundary classes). <b>Class Diagram:</b> Relationship between classes, Generalization/Specialization Hierarchy, Composition and Aggregation Hierarchies, Associations Classes, Constraints.					
PLAN			ACTUAL		
Lect. No.	Date	Topics	Date	Topics covered	Reasons for Deviation
8		Study of classes (analysis level and design level classes)			
9		RUP (Rational Unified Process), CRC (Class, Responsibilities and Collaboration),			
10		Use of Noun Verb analysis (for identifying entity classes, controller classes and boundary classes).			
11		Relationship between classes,			
12		Generalization/Specialization Hierarchy			
13		Composition and Aggregation Hierarchies			
14		Associations Classes, Constraints			
Make up Classes					
Contents Beyond syllabus					
		Solved Gate Base Questions			

<b>UNIT –III: Dynamic Modelling</b>					
<b>Syllabus: Activity diagram:</b> Different Types of nodes, Control flow, Activity Partition, Exception handler, Interruptible activity region, Input and output parameters, Pins. <b>Interaction diagram:</b> Sequence diagram, Interaction Overview diagram, State machine diagram, Advanced State Machine diagram, Communication diagram, Timing diagram.					
<b>PLAN</b>			<b>ACTUAL</b>		
Lect. No.	Date	Topics	Date	Topics covered	Reasons for Deviation
15		Different Types of nodes, Control flow			
16		Activity Partition, Exception handler			
17		Interruptible activity region, Input and output parameters, Pins			
18		Sequence diagram, Interaction Overview diagram			
19		State machine diagram,			
20		Advanced State Machine diagram			
21		Communication diagram			
22		Timing diagram			
<b>Make up Classes</b>					
<b>Contents Beyond syllabus</b>					
		Solved Gate Base Questions			

UNIT –IV : Software Architecture and Quality Attributes					
<b>Syllabus:</b> Introduction to Software Architecture, Importance of Software Architecture, Architectural Structure and Views. <b>Architectural Pattern:</b> common module, Common component-and-connector, Common allocation. <b>Quality Attributes:</b> Architecture and Requirements, Quality Attributes and Considerations					
PLAN			ACTUAL		
Lect. No.	Date	Topics	Date	Topics covered	Reasons for Deviation
23		Introduction to Software Architecture			
24		Importance of Software Architecture			
25		Architectural Structure and Views.			
26		common module, Common component-and-connector			
27		Common allocation			
28		Architecture and Requirements			
29		Quality Attributes and Considerations			
Make up Classes					
Contents Beyond syllabus					
		Solved Gate Base Questions			

<b>UNIT –V: Architectural Design and Documentation</b>					
<b>Syllabus :</b> Architecture in the Life Cycle: Architecture in Agile Projects, Architecture and Requirements, Designing an Architecture. Documenting Software Architecture: Notations, Choosing and Combining views, Building the documentation Package, Documenting Behavior, Documenting Architecture in an Agile Development Project.					
<b>PLAN</b>			<b>ACTUAL</b>		
Lect. No.	Date	Topics	Date	Topics covered	Reasons for Deviation
31		Architecture in Agile Projects,			
32		Architecture and Requirements			
33		Designing an Architecture			
34		Notations, Choosing and Combining views			
35		Building the documentation Package			
36		Documenting Behavior			
37		Documenting Architecture in an Agile Development Project.			
<b>Make up Classes</b>					
<b>Contents Beyond syllabus</b>					
		Solved Gate Base Questions			



UNIT –VI: Design Patterns					
<b>Syllabus: Design Patterns:</b> Introduction, Different approaches to select Design Patterns. <b>Creational patterns:</b> Singleton, Factory, Structural pattern: Adapter, Proxy. <b>Behavioral Patterns:</b> Iterator, Observer Pattern with applications.					
PLAN			ACTUAL		
Lect. No.	Date	Topics	Date	Topics covered	Reasons for Deviation
38		<b>Design Patterns:</b> Introduction			
39		Different approaches to select Design Patterns			
40		Creational patterns: Singleton			
41		Factory, Structural pattern: Adapter			
42		Proxy			
43		<b>Behavioral Patterns:</b> Iterator			
44		Observer Pattern with applications			
Make up Classes					
Contents Beyond syllabus					
		Solved Gate Base Questions			

## PRACTICAL PLAN

LIST OF PRACTICALS									
		Batch T1		Batch T2		Batch T3		Batch T4	
		Plan Date	Actual Date	Plan Date	Actual Date	Plan Date	Actual Date	Plan Date	Actual Date
1	Consider a library, where a member can perform two operations: issue book and return it. A book is issued to a member only after verifying his credentials. Develop a use case diagram for the given library system by identifying the actors and use cases and associate the use cases with the actors by drawing a use case diagram. Use UML tool.								
2	Consider online shopping system. Perform the following tasks and draw the class diagram using UML tool. Represent the individual classes, and objects Add methods Represent relationships and other classifiers like interfaces								
3	Consider the online shopping system in the assignment 2. Draw the sequence diagram using UML tool to show message exchanges								
4	Consider your neighboring travel agent from whom you can purchase flight tickets. To book a ticket you need to provide details about your journey i.e., on which date and at what time you would like to travel. You also need to provide your address. The agency has recently been modernized. So, you can pay either by cash or by card. You can also cancel a booked ticket later if you decide to change your plan. In that case you need to book a new ticket again. Your agent also allows you to book a hotel along with flight ticket. While cancelling a flight ticket you can also cancel hotel booking. Appropriate refund as per policy is made in case of cancellation. Perform the following tasks and draw the use case diagram using UML tool. a. Identify the use cases from a given non-trivial problem statement. b. Identify the primary and secondary actors for a system. c. Use to generalization of use cases and «include» stereotypes to prevent redundancy in the coding phase								
5	Select a moderately complex system and narrate concise requirement Specification for the same. Design the system indicating system elements organizations using applicable architectural styles and design patterns with the help of a detailed Class diagram depicting logical architecture. Specify and document the architecture and design pattern with the help of templates. Implement the system features and judge the benefits of the design patterns accommodated.								

### SUMMARY

No. of lectures allotted by university	
Total no. of lectures conducted	
Percentage of syllabus covered	
Total no. of makeup classes	

**Date:**

**Name and Sign of Subject Teacher**

**Head of Department**

## UNIT WISE QUESTION BANK

### Subject: Software Modeling and Architecture

#### Unit NO 1: Concepts of Software Modelling (07 Hours)

CO1: Analyze the problem statement (SRS) and choose proper design technique for designing web-based/ desktop application

Question no.	Questions	Marks
Q. 1.	What is software modelling? What are the different types of software models?	8M
Q. 2.	What are the characteristics of a Software Architecture	6M
Q. 3.	What are the advantages and disadvantages of Software models?	8M
Q. 4.	What is MDA? What are the steps of MDA ?	6M
Q. 5.	How UML can be used with MDA?	6M
Q. 6.	What is the importance of modeling?	5M
Q. 7.	What is modeling in object oriented analysis and design?	8M
Q. 8.	Create activity diagram model of ' user profile updation' in an email system.	6M
Q. 9.	Explain Usecase modeling of login with Actors, Usecases and System boundary	8M
Q. 10.	Differentiate analysis and architecture.	6M
Q. 11.	Elaborate extend and include with context of use case diagram with Example?	6M
Q. 12.	What does MDA mean architecture?	6M
Q. 13.	What is the 4+1 approach in architecture?	6M
Q. 14.	Explain different views of software architecture.	6M
Q. 15.	What are the major elements of UML? Explain Each Blocks.	4M
Q. 16.	What is unified modeling language list few standard notation and diagrams of UML?	6M

Q. 17.	What life cycle models does Comet work with?	6M
Q. 18.	Explain COMET and phases of COMET.	8M
Q. 19.	What are the 4 main components of a use case diagram?	8M
Q. 20.	What is the importance of use case in designing?	7M
Q. 21.	Explain the basic terminologies and notation related to use cases.	8M
Q. 22.	Explain use case actor who are primary and secondary actors explain with example.	8M

## Unit II: Static Modelling

CO2: Design and analyze an application using UML modeling as fundamental tool

Question no.	Questions	Marks
Q. 1.	What are the methods of RUP?	8M
Q. 2.	Explain the concept of object diagram	
Q. 3.	What is the difference between analysis class and design class?	6M
Q. 4.	Why class diagram is important in static modeling? Explain its relationship?	6M
Q. 5.	State and explain below concepts: a) Class Inheritance b) Overriding c) Polymorphism	8M
Q. 6.	Explain attributes and operation and their representation in Class diagram.	6M
Q. 7.	What is association relationship between classes take a suitable example and draw the Class diagram?	7M
Q. 8.	What is boundary classes controller classes and entity classes?	6M
Q. 9.	Explain different degrees of multiplicity of association between classes with suitable example: a) one to one Association b) one to many Association c) many-to-many Association.	8M
Q. 10.	What are the relationships between classes in class diagram?	8M
Q. 11.	Explain the concept of generalization and specialization of class hierarchies using suitable example and class diagrams.	6M
Q. 12.	Explain aggregation composition with reference to Class diagram.	6M
Q. 13.	Explain generalization with reference to Class diagram.	6M
Q. 14.	Briefly Explain aggregation and composition.	6M
Q. 15.	Explain activity diagram for ATM system.	6M
Q. 16.	Write short Note on Associations Classes.	5M

Q. 17.	Draw Class and Object diagrams for following systems(Any one). A. ATM System. B. Online Shopping. C. Hotel Management System. D. Library Management System. E. Program Execution procedure. F. School information System. G. Railway Reservation System. H. University Automation System.	8M
Q. 18.	What is Component Diagram? Give one Example	5M
Q. 19.	What are the Methods for finding analysis classes	5M
Q. 20.	Draw a sequence diagram for ATM system.	5M
Q. 21.	How is Class diagram different from an object diagram?	6M
Q. 22.	Write down the origin or emergence of analysis classes.	7M
Q. 23.	How to define the analysis class?	5M
Q. 24.	Write down the anatomy analysis class and design class.	5M
Q. 25.	How to find analysis class using noun-verb analysis?	6M
Q. 26.	Describe deployment diagram with example why it is good practice to group use cases in use case package explain the package diagram with and UML notation.	7M
Q. 27.	Define inheritance and polymorphism	7M
Q. 28.	Explain overriding in relation with inheritance	5M
Q. 29.	What is polymorphism explain with example.	5M

### UNIT III: Dynamic Modelling

CO3: Evaluate software architectures

Question no.	Questions	Marks
Q. 1.	Draw sequence diagram for coffee vending machine?	6M
Q. 2.	Explain interaction diagram in brief	5M
Q. 3.	Explain timing diagram in brief.	5M
Q. 4.	What are the types of nodes in activity diagram?	5M
Q. 5.	Explain communication diagram with example.	6M
Q. 6.	Explain the Swimlanes in activity diagram with example.	7M
Q. 7.	Define 1. Control flow, 2. Activity Partition 3. Exception handler	6M
Q. 8.	Explain Briefly the Interruptible activity region and Input and output parameters.	6M
Q. 9.	Explain state chart in details.	5M
Q. 10.	Explain activity diagram with example.	5M
Q. 11.	Explain State machine diagram.	6M
Q. 12.	Write Different Types of nodes in activity diagram	8M
Q. 13.	Write short on Pins.	4M
Q. 14.	What is meant by interaction diagram?	8M
Q. 15.	Explain the Sequence diagram and Interaction Overview diagram.	8M
Q. 16.	What is the concept of state diagram?	8M
Q. 17.	Explain the Advanced State Machine Diagram.	8M
Q. 18.	Write short note on Communication diagram and Timing diagram.	8M



## Unit NO IV: Software Architecture and Quality Attributes

CO4: Use appropriate architectural styles and software design patterns

<b>Question no.</b>	<b>Question</b>	<b>Marks</b>
1.	What do you mean by software architecture?	5M
3	Explain Characteristics of Software Architecture	5M
2.	Explain the Importance of Software Architecture	6M
3.	What is the relationship between architectural models and views?	5M
5.	Explain the following Terms    1. Common module, 2. Common component-and-connector, 3. Common allocation.	5M
6	What are the Disadvantages of Software Architecture	5M
7	What is the meaning of architectural Patterns?	6M
8	Explain the Layered Pattern in software architecture	7M
9	What is the need for software architecture while developing software?	6M
10	Explain different the Quality Attributes with examples?	6M
11	What is quality attributes in software?	5M
12	What are the attributes of quality requirement?	8M
13	Explain the Terms. 1) Architecture and Requirements 2) Quality Attributes	8M

## Unit NO 5: Architectural Design and Documentation

CO5: Apply appropriate modern tool for designing and modeling

Question no.	Question	Marks
1.	What is Architecture in the Life Cycle?	5M
2.	What are the principles of agile architecture?	6M
3	Define software architecture.	5M
4.	What is the role of software architecture in agile?	5M
5.	What are the different influenced aspects for better software architecture?	5M
6..	Explain the term Designing Architecture.	5M
7.	List all the common software architecture structures. Explain the component connector structure	6M
8.	Define architectural style. Mention any four commonly used styles	5M
9.	What is documenting software architecture?	5M
10.	Explain the term Notations.	5M
11	How do you choose software architecture views?	5M
12.	What is a documentation package?	5M
13	Explain building the documentation package	6M
14.	Why is document behavior important?	6M
15.	Explain the Documenting Behavior.	8M
16.	Which is the best approach to documentation in an agile project?	5M
17.	What documentation is required for agile projects?	5M
18	Explain the notations for documenting views.	6M
19	Explain Common component-and-connector in architecture design	7M
20	Explain the steps in Attribute Driven Design?	7M

## Unit NO 6: Design Patterns

CO4, CO5

Question no.	Question	Marks
1.	What is the design pattern?	5M
2.	Write short notes on Adaptor pattern and Observer Pattern.	6M
3.	Write Different approaches to select Design Patterns.	6M
4	Explain in detail about the Factory Pattern and mention the Limitations and applications of Factory pattern	8M
5.	What is the best approach in design patterns?	5M
6	Write short note on Creational, Structural and Behavioral design patterns.	5M
7	Define the terms 1) Singleton Pattern 2) Factory Pattern	8M
8	What is adapter pattern in structural pattern?	5M
9.	Write and explain the algorithm for multithreaded matrix multiplication.	5M
10.	What is the difference between proxy and adapter pattern?	5M
11.	Is Proxy Pattern a structural pattern?	6M
12	What is behavioral pattern in architecture?	8M
13	Explain factory method with its intent, motivation and implementation with suitable example.	6M
14	Explain Iterator design pattern with suitable example.	8M
15	What is singleton pattern? Explain one example scenario where you will use singleton pattern to get applied.	7M
16	Explain Proxy design pattern with example.	6M
17	What is the use of design pattern in modern software development?	6M
18	Explain the term Iteration.	5M
19.	What is Observed Pattern? Give a real life example of the observer pattern?	5M

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**Department of Computer Engineering**

**A.Y. 2024-2025 (Semester-II)**

**UNIT TEST-I**

**Subject: Software Modelling and Architecture**

**Time: 1 Hr**

**Date:**

**Maximum Marks: 30**

**Instructions to Candidates:**

1. Attempt Questions Q.1 OR Q.2, Q.3 OR Q.4
2. Neat diagrams must be drawn wherever necessary
3. Assume suitable data, if necessary

Question no.	Question	Marks	CO	PO
Q.1	a. What is software modelling? What are the different types of software models?	5M	CO1	PO1
	b. What is MDA? What are the steps of MDA ?	5M	CO1	PO1
	c. Create activity diagram model of ' user profile updation' in an email system.	5M	CO1	PO1
<b>OR</b>				
Q.2	a. What is the 4+1 approach in architecture?	5M	CO1	PO1
	b. Explain COMET and phases of COMET.	5M	CO1	PO1
	c. What life cycle models does Comet work with? State and explain below concepts:	5M	CO1	PO1
Q.3	a. 1) Class Inheritance 2)Overriding 3)Polymorphism	5M	CO2	PO1 PO2
	b. Explain activity diagram for ATM system.	5M	CO2	PO1 PO2
	c. What is the need for software architecture while developing software?	5M	CO2	PO1 PO2
<b>OR</b>				
Q.4	Explain different degrees of multiplicity of association between classes with suitable example:			
	a. a) one to one Association b)one to many Association c)many-to-many Association.	5M	CO2	PO1 PO2
	b. Briefly Explain aggregation and composition.	5M	CO2	PO1 PO2
	c. What is Component Diagram? Give one Example	5M	CO2	PO1 PO2

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**A.Y. 2024-2025 (Semester-II)**

**UNIT TEST-I**

**Subject: Software Modelling and Architecture**

**Date:**

**Time: 1 Hr**

**Maximum Marks: 30**

**Instructions to Candidates:**

1. Attempt Questions Q.1 OR Q.2, Q.3 OR Q.4
2. Neat diagrams must be drawn wherever necessary
3. Assume suitable data, if necessary

Question no.	Question	Marks	CO	PO
Q.1	a. What is software modelling? What are the different types of software models?	5M	CO1	PO1
	b. What is modeling in object oriented analysis and design?	5M	CO1	PO1
	c. Differentiate analysis and architecture.	5M	CO1	PO1 PO2
<b>OR</b>				
Q.2	a. Elaborate extend and include with context of use case diagram with Example?	5M	CO1	PO1
	b. What are the major elements of UML? Explain Each Blocks.	5M	CO1	PO1
	c. What life cycle models does Comet work with?	5M	CO1	PO1 PO2
Q.3	a. What is the difference between analysis class and design class?	5M	CO2	PO2
	b. Why class diagram is important in static modeling? Explain its relationship?	5M	CO2	PO2
	c. Explain attributes and operation and their representation in Class diagram..	5M	CO2	PO2
<b>OR</b>				
Q.4	a. Explain different degrees of multiplicity of association between classes with suitable example: a) one to one Association b) one to many Association c) many-to-many Association	5M	CO2	PO2
	b. Write short Note on Associations Classes.	5M	CO2	PO1 PO2
	c. Explain activity diagram for ATM system.	5M	CO2	PO1 PO2

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**A.Y. 2024-2025 (Semester-II)**

**UNIT TEST-II**

**Subject: Software Modelling and Architecture**

**Date:**

**Time: 1 Hr**

**Maximum Marks: 30**

**Instructions to Candidates:**

1. Attempt Questions Q.1 OR Q.2,Q.3 OR Q.4,
2. Neat diagrams must be drawn wherever necessary

Question no.	Question	Marks	CO	PO
Q.1	a. Explain timing diagram in brief.	5M	CO3	PO3
	Define			
	b. 1. Control flow, 2. Activity Partition 3. Exception handler	5M	CO3	PO3
	c. Write short note on Pins.	5M	CO3	PO3
<b>OR</b>				
Q.2	a. Explain Briefly the Interruptible activity region and Input and output parameters.	5M	CO3	PO3
	b. What is meant by interaction diagram?	5M	CO3	PO1 PO3
	c. Write short note on Communication diagram and Timing diagram.	5M	CO3	PO1
Q.3	a. What do you mean by software architecture?	5M	CO4	PO2 PO4
	b. Explain the Importance of Software Architecture	5M	CO4	PO1 PO4
	Define the following terms			
	c. 1. Common module 2. Common component-and-connector 3. Common allocation.	5M	CO4	PO1 PO4
<b>OR</b>				
Q.4	a. What are the Disadvantages of Software Architecture	5M	CO4	PO2 PO4
	b. Explain the Terms. 1) Architecture and Requirements 2) Quality Attributes	5M	CO4	PO2 PO4
	c. What is quality attributes in software?	5M	CO4	PO3 PO4

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**A.Y. 2024-2025 (Semester-II)**

**UNIT TEST-II**

**Subject: Software Modelling and Architecture**

**Date:**

**Time: 1 Hr**

**Maximum Marks: 30**

**Instructions to Candidates:**

1. Attempt Questions Q.1 OR Q.2, Q.3 OR Q.4,
2. Neat diagrams must be drawn wherever necessary

Question no.	Question	Marks	CO	PO
Q.1	a. Explain state chart in details.	5M	CO3	PO1 PO3
	b. What are the types of nodes in activity diagram?	5M	CO3	PO2 PO3
	c. Explain State machine diagram.	5M	CO3	PO1 PO3
<b>OR</b>				
Q.2	a. Write Different Types of nodes in activity diagram	5M	CO3	PO2 PO3
	b. Define Event, State and Transitions.	5M	CO3	PO1 PO3
	c. Draw sequence diagram for coffee vending machine?	5M	CO3	PO2 PO3
Q.3	a. Explain Characteristics of Software Architecture.	5M	CO4	PO2 PO3
	b. What is the relationship between architectural models and views?	5M	CO4	PO1
	c. Explain different the Quality Attributes with examples?	5M	CO4	PO3 PO4
<b>OR</b>				
Q.4	a. What do you mean by software architecture?	5M	CO4	PO2 PO3
	b. Explain the Importance of Software Architecture	5M	CO4	PO2 PO3
	c. Explain the Layered Pattern in software architecture?	5M	CO4	PO3 PO4

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**SET A**

**Department of Computer Engineering**

**A.Y. 2024-2025 (Semester-II)**

**PRELIM EXAM**

**Subject: Software Modelling and Architecture**

**Date:**

**Time: 2.5 hr**

**Maximum Marks: 30**

**Instructions to Candidates:**

1. Attempt Questions Q.1 OR Q.2, Q.3 OR Q.4,
2. Neat diagrams must be drawn wherever necessary
3. Assume suitable data, if necessary

Question no.	Question	Marks	CO	PO
Q.1	a. What are the types of nodes in activity diagram?	6M	CO3	PO2 PO3
	b. Explain Briefly the Interruptible activity region and Input and output parameters.	6M	CO3	PO1 PO3
	c. Explain the Advanced State Machine Diagram.	8M	CO3	PO3 PO4
<b>OR</b>				
Q.2	a. Explain the Advanced State Machine Diagram	6M	CO3	PO3 PO4
	b. Write short note on Communication diagram and Timing diagram.	6M	CO3	PO2 PO3
	c. Explain interaction diagram in brief.	8M	CO3	PO1 PO4
Q.3	a. Explain the Terms. 1) Architecture and Requirements 2) Quality Attributes	6M	CO4	PO1 PO4
	Explain the following Terms 1. Common module, 2. Common component-and-connect 3. Common allocation.	6M	CO4	PO2 PO3
	c. Explain the Layered Pattern in software architecture.	6M	CO4	PO1 PO3
<b>OR</b>				



Q.4	a.	Explain Characteristics of Software Architecture	7M	CO4	PO2 PO4
	b.	What are the attributes of quality requirement?	7M	CO4	PO1 PO4
	c.	Explain the Terms. 1) Architecture and Requirements 2) Quality Attributes	4M	CO4	PO2 PO3
Q.5	a.	What are the principles of agile architecture?	4M	CO5	PO3 PO5
	b.	Explain the term Designing an Architecture..	6M	CO5	PO1 PO4
	c.	What are the different influenced aspects for better software architecture?	8M	CO5	PO3 PO4
<b>OR</b>					
Q.6	a.	Explain the Documenting Behavior.	4M	CO5	PO1 PO4
	b.	Explain the notations for documenting views	6M	CO5	PO3 PO4
	c.	What documentation is required for agile projects?	8M	CO5	PO1 PO4
Q.7	a.	What is the design pattern?	6M	CO6	PO1 PO5
	b.	Write short notes on Adaptor pattern and Observer Pattern.	6M	CO6	PO2 PO3
	c.	What is the difference between proxy and adapter pattern?	6M	CO6	PO2 PO5
<b>OR</b>					
Q.8	a.	Write short note on Creational, Structural and Behavioral design patterns.	6M	CO6	PO1 PO4
	b.	What is Observed Pattern? Give a real life example of the observer pattern?	6M	CO6	PO1 PO5
	c.	Define the terms 1) Singleton 2) Factory	6M	CO6	PO2 PO4

**Sinhgad Technical Education Society's**  
**RMD Sinhgad School of Engineering, Warje, Pune-58**

**SET B**

**Department of Computer Engineering**

**A.Y. 2024-2025 (Semester-II)**

**PRELIM EXAM**

**Subject: Software Modelling and Architecture**

**Date:**

**Time: 2.5 hr**

**Maximum Marks: 30**

**Instructions to Candidates:**

1. Attempt Questions Q.1 OR Q.2, Q.3 OR Q.4,
2. Neat diagrams must be drawn wherever necessary
3. Assume suitable data, if necessary

Question no.	Question	Marks	CO	PO
Q.1	a. Define 1. Control flow, 2. Activity Partition 3. Exception handler	6M	CO3	PO2 PO3
	b. Explain Briefly the Interruptible activity region and Input and output parameters.	6M	CO3	PO2 PO4
	c. Explain State machine diagram.	8M	CO3	PO1 PO4
<b>OR</b>				
Q.2	a. Explain the Sequence diagram and Interaction Overview diagram.	6M	CO3	PO2 PO4
	b. Write short note on Communication diagram and Timing diagram.	6M	CO3	PO1 PO4
	c. What is the concept of state diagram?	8M	CO3	PO3 PO4
Q.3	a. Explain Characteristics of Software Architecture	6M	CO4	PO3 PO4
	b. What is the meaning of architectural Patterns?.	6M	CO4	PO2 PO4
	c. Explain the following Terms 1. Common module, 2. Common component-and-connector, 3. Common allocation.	6M	CO4	PO1 PO3 PO5

**OR**

Q.4	a.	Explain the Layered Pattern in software architecture	7M	CO4	PO1 PO5
	b.	Explain the Terms. 1) Architecture and Requirements 2) Quality Attributes	7M	CO4	PO1 PO3
	c.	What is the need for software architecture while developing software?	4M	CO4	PO1 PO3
Q.5	a.	Define software architecture.	4M	CO5	PO1 PO4
	b.	Explain the term Designing an Architecture..	6M	CO5	PO2 PO4
	c.	List all the common software architecture structures. Explain the component connector structure	8M	CO5	PO3 PO4

**OR**

Q.6	a.	How do you choose software architecture views?	4M	CO5	PO1 PO2
	b.	What documentation is required for agile projects?	6M	CO5	PO1 PO3
	c.	Explain Common component-and-connector in architecture design	8M	CO5	PO1 PO4
Q.7	a.	Explain in detail about the Factory Pattern and mention the Limitations and applications of Factory pattern	6M	CO6	PO2 PO4
	b.	What is adapter pattern in structural pattern?	6M	CO6	PO1 PO4
	c.	Write and explain the algorithm for multithreaded matrix multiplication.	6M	CO6	PO1 PO5

**OR**

Q.8	a.	What is singleton pattern? Explain one example scenario where you will use singleton pattern to get applied.	6M	CO6	PO2 PO5
	b.	Explain Proxy design pattern with example.	6M	CO6	PO1 PO4
	c.	Explain the term Iteration.	6M	CO6	PO2 PO5