

**CS-5320: Software Architecture
M.Tech II Semester**

Course Outcomes (COs):

CO1: Understand the fundamentals of software architecture.

CO2: Study the various architecture evaluation techniques.

CO3: Apply architectural styles in different applications.

CO4: Analysis of design patterns.

CO5: Apply design patterns in producing quality software.

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Course Contents

Unit-I Basic Concepts, Designing Architectures

No. of Hrs: 8

Understanding Software Architecture- Concepts, Models, Processes, Stakeholders. The Design Process, Architectural Conception, Refined Experience in Action: Styles and Architectural Patterns, Architectural Conception in Absence of Experience.

Unit-II Connectors, Modeling

No. of Hrs: 8

Connectors in Action: A Motivating Example, Connector Foundations, Connector Roles, Connector Types and Their Variation Dimensions, Example Connectors, Modeling Concepts, Ambiguity, Accuracy, and Precision, Complex Modeling: Mixed Content and Multiple Views, Evaluating Modeling Techniques (ATAM, SAAM, CBAM etc.), Specific Modeling Techniques.

Unit-III Analysis, Implementation and Deployment

No. of Hrs: 8

Concepts, Existing Frameworks, Software Architecture and Deployment, Software Architecture and Mobility, Pipes and Filters, Event- based, Implicit Invocation, Layered systems, Repositories Interpreters, Process control. Distributed and Networked Architectures, Architectures for Network-Based Applications, Decentralized Architectures. Service-Oriented Architectures and Web Services.

Unit-IV Introduction to Design Patterns

No. of Hrs: 8

What Is a Design Pattern? Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern. Design Anti-Patterns.

Unit-V Applications of Design Patterns

No. of Hrs: 8

Categories of Design Patterns. Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton. Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy. Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, Strategy, Template Method, Visitor.

Text Books:

1. *Software Architecture in Practice- Len Bass, Paul Clements, Rick Kazman, Pearson, 4th Edition, 2021.*
2. *Software Architecture: Foundations, Theory, and Practice- Richard N. Taylor, Nenad Medvidovic, Eric Dashofy, 2009.*

3. Design Patterns: : Elements of Reusable Object Oriented- **Erich Gamma et al**, Pearson Education, 2015.

Reference Books

4. *Software Engineering: Concepts & Practices*- **Ugrasen Suman**, Cengage Learning Publications, 2nd Ed., 2022.
5. *Fundamentals of Software Architecture, An Engineering Approach*- **Mark Richards, Neal Ford**, O'Reilly Media 2020.
6. Design Patterns Explained -**Alan Shalloway**, Pearson Education.