17CS31E3 - SOFTWARE ARCHITECTURE

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| **Course Category:** | Program Core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture – Tutorial – Practical:** | 3-0-0 |
| **Prerequisite:** | Need to know the fundamentals of Software engineering | **Sessional Evaluation:**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |
| **Objectives** | * Understand basic software architecture requirements, views and patterns etc. * Evaluate software architecture and quality attributes * Select and use appropriate architectural styles * Explore appropriate key architectural structures, tactics and methods * Defining guidelines for documenting software Architecture | | |

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| **Course Outcomes** | Upon successful completion of the course, the students will be able to: | |
| CO1 | Understand the basics of software architectural requirements, views, patterns and influences on business and technical issues |
| CO2 | Analyze the quality attributes and to apply the same to prepare the documentation based on the suitability of attributes |
| CO3 | Specify the key structures, tactics and patterns to design and specify the architecture. |
| CO4 | Study different methods of agility and understand the business goals using other methods including various design strategies |
| CO5 | Prepare a document for a given architecture using views |
| CO6 | Identify the factors that influence the management and governance |
| **Course Content** | UNIT – I  **Introduction to Software Architecture:** Definitions**,** Architectural Structures and Views, Patterns, What Makes a “Good” Architecture.  **Importance of Software Architecture:** System’s Quality Attributes, change and prediction, communication enhancement, Design Decisions, Constraints, Influences, Evolutionary Prototyping, Improving Cost and Schedule Estimates, Transferable, Reusable Model, Independently Developed Components, Vocabulary of Design Alternatives and Training.  UNIT – II  **Context of Software Architecture:** Technical Context, Project Life-Cycle, Business, Professional**,** Stakeholders and influences  **Quality Attributes:** Architecture and Requirements, Functionality ,Considerations, Requirements, Achieving Quality Attributes through Tactics, Guiding Design Decisions, Other Quality Attributes  UNIT – III  **Architectural Tactics and Patterns:** Architectural Patterns, Overview, Relationships between Tactics and Patterns.  **Quality Attribute Modeling and Analysis :** Modeling Architectures, Attribute Analysis and Checklists, Experiments, Simulations, and Prototypes, Different Stages of the Life  UNIT – IV  **Architecture in Agile Projects: Overview,** Agility and Architecture Methods, examples, Guidelines for the Agile.  **Architecture and Requirements:** Gathering ASRs from Requirements Documents, Stakeholders, Understanding the Business Goals, Utility Tree and Methods.  **Designing an Architecture:** Design Strategy, The Attribute-Driven Design Method and supporting steps  UNIT – V  **Documenting Software Architectures:** Uses and Audiences for Architecture Documentation, Notations, and Views, Choosing and Combining Views, Building the Documentation Package, Documenting Behavior, Architecture Documentation and Quality Attributes.  **Architecture, Implementation, and Testing:** Architecture and Implementation, Architecture and Testing.  **Architecture Reconstruction and Conformance:** Architecture Reconstruction Process, View Extraction, Database Construction, View Fusion, Finding Violations and Guidelines.  **UNIT – VI**  **Architecture Evaluation:** Evaluation Factors, Architecture Tradeoff Analysis Method and Evaluation.  **Management and Governance:** Planning, Organizing, Implementing, Measuring and Governance.  **Architecture and Software Product Lines:** Example of Product Line Variability, What Makes a Software Product Line Work, Scope, The Role of a Product Line Architecture, Variation Mechanisms, Evaluation and Key Issues. | |
| **Text Books and References:** | **Text Book:**   1. Len Bass, Paul Clements, Rick Kazman “Software Architecture in Practice”, Third Edition**,** Addison Wesley Publishers, 2013.   **Reference Books:**   1. Mary Show, David Garlan**, “S/W Arch. Perspective: on an Emerging Discipline”,** 1996, PHI. 2. Jeff Garland, Richard Anthony, “Large**-Scale Software Architecture A Practical Guide using UML**”, John Wiley and Sons Ltd, 2003. 3. Oliver Vogel, Ingo Arnold, Arif Chughtai, Timo Kehrer “**Software Architecture A Comprehensive Framework and Guide for Practitioners**”, Springer Publishers, 2009. 4. Ian Gorton, “**Essential Software Architecture**”, Second Edition, Springer Publishers, 2011. | |
| **E-Resources** | 1. [**https://nptel.ac.in/courses**](https://nptel.ac.in/courses) 2. [**https://freevideolectures.com/university/iitm**](https://freevideolectures.com/university/iitm) | |