GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Subject Code : ME02000311

Subject Name : Software Architecture and Software Engineering

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	PCC

Prerequisite:	Software Engineering, UML
Rationale:	At the heart of every well-engineered software system is its software architecture and design. Software architecture deals with the high-level building blocks that represent an underlying software system. These building blocks are the components (units of computation in a system), the connectors (models of the interactions between software components), and the configurations (arrangements of software components and connectors, and the rules that guide their composition). This course will teach students how to use modern processes, methods, and tools used in architecting, modelling, and designing software systems. Students will learn the importance of developing sound software architecture as part of the overall software design.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Understand the need for software architecture and relationship to low-level design
02	Develop architectural approaches from requirements and manage traceability between architecture and requirements
03	Analyze tradeoffs among multiple architectural alternatives
04	Utilize quality attributes when designing software architectures
05	Recognize architectural patterns and apply them appropriately

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE E	PA M	ESE V	PA I	
3	0	2	4	70	30	30	20	150

Content:

Unit No.	Content	No. of Hours	% of Weightage
1	Software Engineering, Software Process, Process Models – Waterfall, Incremental, Evolutionary Process Model – Prototype, Spiral and concurrent Development Model. Need of Agile software development, agile context– Manifesto, Principles, Methods, Values, Roles, Artifacts, Stakeholders, and challenges. Business benefits of software agility. Extreme Programming- Core principles, values and practices. SCRUM: Scrum practices –Working of scrum, Project velocity, Burn down chart, Sprint backlog, Sprint planning and retrospective, Daily scrum, Scrum roles– Product Owner, Scrum Master, Scrum Team.	10	25%
2	Software Design Concepts and Design Principal, Architectural Design, Component Level Design (Function Oriented Design, Object Oriented Design), User Interface Design, Web Application Design.	10	25%
3	History of Software Architecture, Architecture - motivation and	8	15%

	definition, Architecture and Agile, Quality attributes and QA scenarios, Introducing Tactics for Performance, Availability , Security, Usability, Modifiability and Other quality attributes		
4	Architectural Structures and Views : dataflow architecture, pipes and filters architecture, call-and return architecture, data-centered architecture, layered architecture, agent based architecture, Micro-services architecture, Reactive Architecture, Representational state transfer architecture etc.	11	25%
5	Software Architecture analysis : Cost Benefit Analysis Method (CBAM), Architecture Tradeoff Analysis Method (ATAM)	6	10%
TOTAL		**45**	**100**

REFERENCE BOOKS:

1. Software Architecture in Practice - 4th Edition: Len Bass, Paul Clements, Rick Kazman. Pearson, 2020.
2. Software Architecture: Foundations, Theory, and Practice: R. N. Taylor, N. Medvidovic, and E. M. Dashofy. John Wiley & Sons, 2009.
3. Software Engineering- A practitioner's Approach: Roger S.Pressman, McGraw-Hill International Editions

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