Course code: Course Title	Course Structure			Pre-Requisite
SE404: Advances in Software Engineering	L	T	P	Software Engineering
	3	1	0	

Course Objective: To study about formal specification, cleanroom software engineering, component-based software engineering, client-server software engineering and web engineering.

S. NO	Course Outcomes (CO)
CO1	Understand, remember, and apply formal methods and mathematical notation.
CO2	Apply Cleanroom software engineering principles to develop high-reliability software systems.
CO3	Analyze component-based software engineering processes, including component qualification, adaptation, and reuse.
CO4	Design and develop client-server and web-based applications.
CO5	Analyze software reengineering concepts, including reverse engineering, restructuring, and forward engineering.

S.No.	Contents	Contact Hours
UNIT 1	**Formal Methods:** Deficiencies of Less Formal Approaches, Mathematics in Software Development, Mathematical Preliminaries, Sets and Constructive Specification, Set Operators, Logic Operators, Sequences, Applying Mathematical Notation for Formal Specification, Formal Specification Languages, Using Z to Represent an Example Software Component.	8
UNIT 2	**Cleanroom Software Engineering:** The Cleanroom Approach, The Cleanroom, Functional Specification, Black-Box Specification, State-Box Specification, Clear-Box Specification, Cleanroom Design, Design Refinement and Verification, Advantages of Design Verification, Cleanroom Testing, Statistical Use Testing.	6
UNIT 3	**Component-Based Software Engineering:** Engineering of Component-Based Systems, The CBSE Process, Domain Engineering, The Domain Analysis Process, Characterization Functions, Structural Modeling and Structure Points, Component-Based Development, Component Qualification, Adaptation, and Composition, Component Engineering, Analysis and Design for Reuse, Classifying and Retrieving Components , Economics of CBSE.	10
UNIT 4	**Client/Server Software Engineering:** The Structure of Client/Server Systems, Software Engineering for c/s Systems, Analysis Modeling Issues, Design for c/s Systems, Architectural Design for Client/Server Systems, Conventional Design Approaches for Application Software, Database Design, An Overview of a Design Approach, Process Design Iteration, Testing Issues, Overall c/s Testing Strategy, Testing Tactics.	6
UNIT 5	**Web Engineering**: The Attributes of Web-Based Applications, Quality Attributes, The Technologies, The WebE Process, Framework for WebE, Formulating/Analyzing Web-Based Systems, Formulation Analysis, Design for Web-Based Applications, Architectural Design, Navigation Design, Interface Design, Testing Web-Based Applications, Management Issues, The WebE Team, Project Management, SCM Issues for WebE.	6
UNIT 6	Reengineering: Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering for Client/Server Architectures, Object-Oriented and for User Interfaces, The Economics of Reengineering.	6
	TOTAL	42

REFERENCES		
S.No.	**Name of Books/Authors/Publishers**	**Year of Publication / Reprint**
1.	Roger S. Pressman, Bruce R. Maxim, "Software Engineering – A Practitioner's Approach", McGraw Hill, 8th Edition.	**2014**