Software Engineering and Design

Course Code	**21CS44 / 21IS44**	**Course type**	**PCC**	**Credits L-T-P**	3 - 0 - 1
Hours/week: L - T- P	3 - 0 - 2			**Total credits**	4
Total Contact Hours	L = 40 Hrs; T = 0 Hrs; P = 20 Hrs Total = 60 Hrs			**CIE Marks**	100
Flipped Classes content	10 Hours			**SEE Marks**	100

Course learning objectives	
1.	Contrast use of Software Engineering and associated processes using standard models.
2.	Identify the software functions and associated component to design architectural framework.
3.	Decide the separation of concern and design relevant processes for the required operations.
4.	Prepare test cards to measure project performance accomplishing specified requirements.
5.	Evaluate software quality based on industry perspectives and relevant versions.

Required Knowledge of : Basics of any programming language, software types, functions and steps of software development

Unit – I	**Contact Hours = 8 Hours**

Introduction:
Professional software development, Software engineering ethics, Case studies.

Software Processes: Software Process models: The Waterfall model – A Case study, Incremental development, Reuse-oriented software engineering, Process activities: Software specification, Software design and implementation, Software validation, Coping with Change: Prototyping, Incremental Delivery, Boehm's Spiral Model.
Text Book 1: Chapters -1, Chapter-2

Unit – II	**Contact Hours = 8 Hours**

Requirements Engineering: Functional and non-functional requirements*:* Functional requirements. Non-functional requirements, Introduction to Requirements specification.

Agile Software Development: Agile methods- Plan driven and Agile Development, Introduction to Extreme Programming.
Text Book 1: Chapters -3, Chapter-4

Unit – III	Contact Hours = 8 Hours
Design and Implementation: Object-oriented design using UML: System Context and Interaction, Architectural design, Object Class identification, design Models, Interface Specification, Design Patterns, Implementation issues, Open Source development. Text Book 1: Chapters -7	

Unit – IV	Contact Hours = 8 Hours
Software Testing: Development Testing: Unit Testing, Choosing Unit Test Cases, Component Testing, System Testing, Test Driven Development, Release Testing: Requirements Based Testing, Scenario Testing, Performance Testing, User Testing. A Demo of Selenium. Text Book 1: Chapter-8 Ref. Book 2: Chapters -5, Chapter-14	

Unit – V	Contact Hours = 8 Hours
Quality Management: Introduction, Software quality, Software standards: The ISO 9001 standard framework, Reviews and inspection. **Configuration management:** Introduction to Change management, Version management, System building, Release management. Text Book 1: Chapters -24, Chapter-25 Ref. Book 2: Chapters -8	

Flipped Classroom Details

Unit No.	I	II	III	IV	V
No. of hrs. for Flipped Classroom Sessions	1	2	2	2	2

List of Experiments

Unit No.	No. of Experiments	Topic(s) related to Experiment
1	1	Software Processes & process flow diagram using online open source design tool.
2	2	Requirements Engineering: Requirement collection, listing of important functions and analysis. Tools Used for Story card Preparation and estimation of task
3	3	Software Design & Development listing the actors with relevance and listing of use-cases summarizing the purpose. Design sequence diagram any one of the function identified with all suitable constructs. Draw an Activity diagram for any software design tools.
4	3	Software Testing-Unit Testing with example & Prepare software Test Document compare test results. Testing based on system testing, Integration tests & automation using the tool.
5	1	Project work: use case of any Common Software Application listing all the functional & non-functional requirements, Show the suitable

		process model with justification along with mode of data transaction using ER diagram. Design test cases & prototype model by using FIGMA.

Unit No.	Self-Study Topics
I	Identification of requirements for any common software in use by business domain and the advantages.
II	Classification of functional and non-functional requirements of any software used in business domain. Software Architectural patterns, implementation and uses.
III	Object oriented software and UML: Business use-case Design and Activity diagrams
IV	Software testing ISO 9001 series – Guidelines applicable to software industry
V	Software Quality & Performance: Git-Hub based topics with ref. link: https://github.com/ICTU/quality-time

Books	
	Text Books:
1.	Ian Summerville: Software Engineering, Pearson Education, 9th Edition onwards
	Reference Books:
1.	Roger .S. Pressman: Software Engineering-A Practitioners approach, 8th Edition and above, Tata McGraw Hill
2.	Paul C. Jorgensen: Software Testing Craftsman's Approach, 4th Edition CRC Press, Taylor Francis Group
3.	Rajib Mall, Fundamentals of Software Engineering , 4thEdition onwards PHI Learning Pvt. Ltd.
4.	Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India, 2009 onwards Resources
	E-resources (NPTEL/SWAYAM.. Any Other)- mention links
1.	**NPTEL:** https://nptel.ac.in/courses/106105182
2.	**SWAYAM:** https://onlinecourses.swayam2.ac.in/cec20_cs07/preview
3.	**IIT Chennai:** https://onlinedegree.iitm.ac.in/course_pages/BSCCS3001.html

Course delivery methods		Assessment methods	
1.	Chalk and Talk	1.	IA tests
2.	PPT and Videos	2.	Open Book Assignments (OBA)/ Lab Project
3.	Flipped Classes	3.	Lab Test
4.	Practice session/Demonstrations in Labs	4.	Semester End Examination
5.	Enquiry Based Learning		

Course Outcome (COs) **Learning Levels:** **(Re - Remember; Un - Understand; Ap - Apply; An - Analysis; Ev - Evaluate; Cr – Create)**				
At the end of the course, the student will be able to		**Learning Level**	**PO(s)**	**PSO(s)**
1.	**Define** the professional practice for software development and understand the ethical responsibilities of Software Engineer.	Re	1	1
2.	**Explain** the requirements for associated processes, feasibility and decide the suitable model of software.	Un	2	1, 2
3.	**Choose** software design accumulating information and the functional components for the development.	Ap	2, 3, 5	2, 3
4.	**Apply** the software testing methods.to check the accuracy based on the analysis of contextual requirement.	Ap	3, 4, 5	2, 3
5.	**Analyze** software that matches with industry needs and adapt the changes based on demand for the continuous quality improvement.	An	4	3

Scheme of Continuous Internal Evaluation (CIE):

For integrated courses, a lab test also will be conducted at the end of the semester. The lab test **(COMPULSORY)** will be part of the CIE. **No SEE for Lab**.

THEORY (60 marks)			**LAB (40 marks)**		Total
IA test 1	IA test 2	Assignment (OBA/Lab Project/ Industry assignment)	Conduction	Lab test	
25 marks	25 marks	10 marks	15 marks	25 marks	100 marks

IA Test:

1. No objective part in IA question paper
2. All questions descriptive

Conduct of Lab:

1. Conducting the experiment and journal: 5 marks
2. Calculations, results, graph, conclusion and Outcome: 5 marks
3. Viva voce: 5 marks

Lab test: (Batch-wise with 15 students/batch)

1. Test will be conducted at the end of the semester
2. Timetable, Batch details and examiners will be declared by Exam section
3. Conducting the experiment and writing report: 5 marks
4. Calculations, results, graph and conclusion: 10 marks
5. Viva voce: 10 marks

Eligibility for SEE:

1. 40% and above (24 marks and above) in theory component
2. 40% and above (16 marks and above) in lab component
3. **Lab test is COMPULSORY**
4. Not eligible in any one of the two components will make the student **Not Eligible** for SEE

Scheme of Semester End Examination (SEE):	
1.	It will be conducted for 100 marks of 3 hours duration.
2.	**Minimum marks required in SEE to pass: 40 out of 100**
3.	Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

Rubrics: Levels	Target
1 (Low)	**60% of the students score Less than 50 % of the total marks.**
2 (Medium)	**60% of the students score between 50 – 70 % of the total marks.**
3 (High)	**60% of the students score More than 70 % of the total marks.**

CO-PO Mapping (planned)													CO-PSO Mapping (planned)		
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
1	√												√		
2		√											√	√	
3		√	√		√								√	√	
4		√		√	√									√	√
5			√	√	√										√
Tick mark the CO, PO and PSO mapping															