Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY, BANGALORE

COURSE PLAN

Academic Year 2018-19

Program:	B E – Computer Science & Engineering
Semester :	4
Course Code:	18CS45
Course Title:	SOFTWARE ENGINEERING
Credit / L-T-P:	4 / 4-0-0
Total Contact Hours:	50
Course Plan Author:	CHANDANA L S

Academic Evaluation and Monitoring Cell

No.29. Chimany Hills, Hesaragatta Road, Chikkabanavara

Bangalore – 560090, KARNATAKA, INDIA

Phone / Fax :+91-08023721315/23721477

www.skit.org.in

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Note : Remove “Table of Content” before including in CP Book
Each Course Plan shall be printed and made into a book with cover page

Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. COURSE INFORMATION

1. Course Overview

Degree:	B.E	Program:	CS
Year / Semester :	2nd /IV	Academic Year:	2018-19
Course Title:	Software Engineering	Course Code:	18CS45
Credit / L-T-P:	4-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50	SEE Marks:	60 Marks
CIA Marks:	40	Assignment	1 / Module
Course Plan Author:	CHANDANA L S	Sign	Dt:
Checked By:		Sign	Dt:
CO Targets	CIA Target : 60%	SEE Target:	60 %

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute. Identify 2 concepts per module as in G.

Module	Content	Teaching Hours	Identified Module Concepts	Blooms Learning Levels
1	Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies. Models: Waterfall Model , Incremental Model and Spiral Model . Process activities.	5	-Software lifecycle	L4 Analyze
	Requirements Engineering Processes .Requirements Elicitation and Analysis . Functional and non-functional requirements . The software Requirements Document .Requirements Specification. Requirements validation .Requirements Management .	5	-Software Requirement Specifications	L3 Apply
2	Context models . Interaction models Structural models . Behavioral models . Model-driven engineering.	5	-System Models	L3 Apply
	Introduction to RUP , Design Principles. Object-oriented design using the UML. Design patterns. Implementation issues. Open source development.	5	-Software Design and implementation	L4 Analyze
3	Development testing, Test-driven development , Release testing , User testing. Test Automation.	5	-Software Testing	L3 Apply
	Evolution processes . Program evolution dynamics. Software maintenance. Legacy system management	5	-Software evolution	L4 Analyze
4	Software pricing . Plan-driven development. Project scheduling: Estimation techniques .	5	-Software plan	L4 Analyze
	Software quality. Reviews and inspections. Software measurement and metrics. Software standards.	5	-Quality management	L2 Understand
5	Coping with Change , The Agile Manifesto: Values and Principles.	5	-Agile project management	L2 Understand
	SCRUM and Extreme Programming. Plan-driven and agile development . Agile project management , Scaling agile methods	5	-SCRUM	L2 Understand
-	**Total**	**50**	-	-

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).
1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modules	Details	Chapters in book	Availability
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1,2,3,4,5	Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012.	1,2,3,4, 5, 7, 8, 9, 23, 24	In Lib / In Dept
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1,2,3,4,5	Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.		In Lib
1,2,3,4	Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India	1,2,3,4, 5, 7, 8	In Lib
C	**Concept Videos or Simulation for Understanding**	**-**	**-**
C1	Software life cycle https://www.youtube.com/watch?v=G-6qDY8UltU https://www.youtube.com/watch?v=DRDD7UWX2y4		
C2	Software Requirement Specifications https://www.youtube.com/watch?v=_XTQjKhh6hQ		
C3	System Models https://www.youtube.com/watch?v=8kj__V8ehDU		
C4	Software Design and Implementation https://www.youtube.com/watch?v=567ZkNUJ5Is https://www.youtube.com/watch?v=Fv6i4ja2O6w		
C5	Software Testing https://www.youtube.com/watch?v=kpT95Jb3t3U		
C6	Software Evaluation https://www.youtube.com/watch?v=A4aeXlRqJ_Y		
C7	Software Plan https://www.youtube.com/watch?v=KoZmFEhE6-8		
C8	Quality Management https://www.youtube.com/watch?v=18cN8MZvJRA		
C9	Agile Project Management https://www.youtube.com/watch?v=lP8vjBrswSs		
C10	SCRUM https://www.youtube.com/watch?v=IKqMYcl6zeM		
D	**Software Tools for Design**		
E	**Recent Developments for Research**	**-**	**-**
	Future trends in software engineering for mobile apps - https://ieeexplore.ieee.org/document/7476770		
F	**Others (Web, Video, Simulation, Notes etc.)**	**-**	**-**
1	Software development life cycle phases https://www.softwaretestinghelp.com/software-development-life-cycle-sdlc/		
2	Software-automation testing *https://smartbear.com/learn/automated-testing/what-is-automated-*		

	testing/		

4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.
Students must have learnt the following Courses / Topics with described Content . . .

Modules	Course Code	Course Name	Topic / Description	Sem	Remarks	Blooms Level
1	18CS45	Software Engineering	Software/ Knowledge of Software	4	Have used different software in laboratory	Understand L2
2	18CS45	Software Engineering	No per-requisite to be considered as basics shall be taught as curriculum	4	-	-
3	18CS45	Software Engineering	No per-requisite to be considered as basics shall be taught as curriculum	4	-	-
4	18CS45	Software Engineering	No per-requisite to be considered as basics shall be taught as curriculum	4	-	-
5	18CS45	Software Engineering	No per-requisite to be considered as basics shall be taught as curriculum	4	-	-

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.
Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Modules	Topic / Description	Area	Remarks	Blooms Level
1	Management Classical analysis	Management	Required for Higher Education, Entrepreneurship	L4
2	Design Heuristic	Software design	Industry & profession requirements	L4
3	Testing control structure , black box and white box testing	Software testing	Industry & profession requirements	L4
4	LOC estimation	Software quality analysis	Entrepreneurship	L4
5	Agile development tools	Software development	Industry & profession requirements	L2

B. OBE PARAMETERS

1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs. Identify a max of 2 Concepts per Module. Write 1 CO per Concept.

Modules	Course Code.#	Course Outcome **At the end of the course, student should be able to . . .**	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
1	18CS45.1	Explore the various types of software system	5	Software lifecycle	Lecture	Slip test	L4 Analyze
	18CS45.2	Identify the software development requirements	5	Software Requirement	Explanation	Q & A	L3 Apply

				Specifications			
2	18CS45.3	Interpret the usage of suitable software models	5	System Models	Description	Q & A	L3 Apply
	18CS45.4	Compare various design techniques for software development.	5	Software Design and implementation	Explanation	Q & A	L4 Analyze
3	18CS45.5	Illustrate the principles for validating the software requirements .	5	Software Testing	Examine	Focused on analyzing /compare	L3 Apply
	18CS45.6	Examine the change requirements for software maintenance .	5	Software evolution	Description	Q & A	L4 Analyze
4	18CS45.7	Analyze the software project management plans	5	Software plan	Explanation	Slip test	L4 Analyze
	18CS45.8	Identify the quality assurance procedures	5	Quality management	Description	Q & A	L2 Understand
5	18CS45.9	Understand the importance of agile project management	5	Agile project management	Develop	Q & A	L2 Understand
	18CS45.10	Explain the Agile method for Software Development .	5	SCRUM	Description	Q & A	L2 Understand
-	**-**	**Total**	**50**	**-**	**-**	**-**	**L2-L4**

2. Course Applications

Write 1 or 2 applications per CO.
Students should be able to employ / apply the course learnings to . . .

Modules	Application Area Compiled from Module Applications.	CO	Level
1	Software development industries	CO1	L4
1	Medicine manufacturing industries	CO2	L3
2	Embedded Systems	CO3	L3
2	Real-Time Systems	CO4	L4
3	Safety-Critical Systems	CO5	L3
3	Business oriented systems	CO6	L4
4	Service Oriented Architectures	CO7	L4
4	Manufacturing industries	CO8	L2
5	Agile software development	CO9	L2
5	Software industries using agile methods	CO10	L2

3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.
To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Modules	Mapping		Mapping Level	Justification for each CO-PO pair	Level
-	**CO**	**PO**	**-**	**'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'**	**-**
1	CO1	PO1	2.35	Knowledge of software processes and requirement engineering is required for complex software development problems	L4
1	CO1	PO2	2.35	Knowledge of requirement analysis is required in development process	L4
1	CO1	PO3	2.35	To design a solution to complex software development process knowledge of software processes is required	L4

1	CO1	PO4	2.3	Investigation of different software processes is required to provide solution to the complex engineering problems	L4
1	CO1	PO6	2.25	Knowledge of societal and safety issues should be considered for professional engineering practice	L4
1	CO1	PO7	1.5	Understanding the professional ethics is required to develop a software	L4
1	C01	PO12	2.35	Identifying the constraints and requirements for a software development is a life long learning process.	L4
1	CO2	PO1	2.35	Knowledge of requirement engineering is required for complex software development problems	L3
1	CO2	PO2	2.35	Knowledge of requirement analysis is required in development process	L3
1	CO2	PO3	2.35	To design a solution to complex software development process knowledge of Requirement engineering is required	L3
1	CO2	PO4	2.3	Investigation of different types of requirements is required to provide solution to the complex engineering problems	L3
1	CO2	PO6	2.25	Knowledge of societal and safety issues should be considered for professional engineering practice.	L3
1	CO2	PO7	1.5	Understanding the professional ethics is required to develop a software.	L3
1	CO2	PO12	2.35	Identifying the constraints and requirements for a software development is a life long learning process.	L3
2	CO3	PO1	2.35	Knowledge of system models is required in design and implementation of software development process	L3
2	CO3	PO2	2.35	Analyzing the suitable model for software development process requires knowledge of system models	L3
2	CO3	PO3	2.35	To design a solution to complex software development process knowledge of software design and implementation techniques is required	L3
2	CO3	PO4	2.3	Knowledge of different system models is required to analyze a system design	L3
2	CO3	PO9	1.5	Knowledge of software development is required to function effectively as an individual or leader or team to arrive a particular design	L3
2	CO4	PO12	2.35	Identifying the constraints and requirements for a software development is a life long learning process.	L3
2	CO4	PO1	2.35	Knowledge of various design techniques is required for software development process	L4
2	CO4	PO2	2.35	Analyzing the suitable design techniques for software implementation.	L4
2	CO4	PO3	2.35	To design a solution to complex software development process knowledge of software design and implementation techniques is required	L4
2	CO4	PO4	2.3	Knowledge of different system design is required to analyze a system implementation.	L4
2	CO4	PO9	1.5	Knowledge of software development is required to function effectively as an individual or leader or team to arrive a particular design	L4
2	CO4	PO12	2.35	Identifying the constraints and requirements for a software development is a life long learning process.	L3
3	CO5	PO1	2.35	To check the feasibility of software , knowledge of software testing methods is required	L3
3	CO5	PO2	2.35	To test complex software for their functionality , knowledge of testing techniques is required	L3
3	CO5	PO3	2.35	To design any software it requires knowledge of various levels of testing .	L3
3	CO5	PO12	2.35	Identifying the design refinements for a software development is a life long learning process.	L3
3	CO6	PO1	2.35	To check the possible changes of software , knowledge of software evolution methods is required	L4
3	CO6	PO2	2.35	For software maintenance knowledge of evolution techniques is required	L4
3	CO6	PO3	2.35	To design any required changes to a software requires knowledge of evolution techniques.	L4
3	CO6	PO12	2.35	Identifying the design refinements for a software development is a life long learning process.	L4
4	CO7	PO1	2.35	Knowledge of software planning is required to give solution to complex	L4

				software engineering problems	
4	CO7	PO2	2.35	Analyzing the factors of project planning is required to develop solution to complex software requirement.	L4
4	CO7	PO3	2.35	To design a solution for complex engineering problems using software requires knowledge of project planning.	L4
4	CO7	PO4	2.3	Research based knowledge is required to assure the correctness of plan for software development	L4
4	CO7	PO6	2.25	Societal and legal issue knowledge is required to provide quality assurance for a software development	L4
4	CO7	PO12	2.35	Identifying the constraints and requirements for a software development is a life long learning process.	L4
4	CO8	PO1	2.35	Knowledge of quality assurance is required to give solution to complex software engineering problems	L4
4	CO8	PO2	2.35	Analyzing the factors of project planning is required to develop a software	L2
4	CO8	PO3	2.35	To design a solution for complex engineering problems requires knowledge of project planning	L2
4	CO8	PO4	2.3	Research based knowledge is required to assure the quality of a software development	L2
4	CO8	PO6	2.25	Societal and legal issue knowledge is required to provide quality assurance for a software development	L2
4	CO8	PO12	2.35	Identifying the constraints and requirements for a software development is a life long learning process.	L2
5	CO9	PO1	2.35	The software's which demand higher flexibility in development requires knowledge of agile development	L2
5	CO9	PO2	2.35	Complex software's requiring iterative and incremental development requires analysis of change implementation using agile development	L2
5	CO9	PO3	2.35	To design and develop complex software requires knowledge of agile development process.	L2
5	CO9	PO4	2.3	Investigation of different agile software development processes requires knowledge of coping with change in agile environment.	L2
5	CO9	PO6	2.25	Knowledge of societal, safety should be applied for software development	L2
5	CO9	PO8	1	Knowledge of ethical principles is required for software development	L2
5	CO9	PO12	2.35	Knowledge of software development is identified for life long learning process.	L2
5	CO10	PO1	2.35	The software which demand higher flexibility in development requires knowledge of agile method	L2
5	CO10	PO2	2.35	Complex software's requiring iterative and incremental development requires analysis of agile methods	L2
5	CO10	PO3	2.35	To design and develop complex software requires knowledge of agile methods like SCRUM	L2
5	CO10	PO4	2.3	Investigation of different agile software development processes requires knowledge of agile methods	L2
5	CO10	PO6	2.25	Knowledge of societal , safety should be applied for software development	L2
5	CO10	PO8	1	Knowledge of ethical principles is required for software development	L2
5	CO10	PO12	2.35	Knowledge of software development is identified for life long learning process	L2

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Course Outcomes	Program Outcomes														-
Modules	CO.#	**At the end of the course student should be able to . . .**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Level
1	18CS45.1	Explore the various types of software system	2.35	2.35	2.35	2.3	-	2.25	1.5	-	-	-	-	2.35				L4 Analyze

1	18CS45.2	Identify the software development requirements	2.3 5	2.3 5	2.3 5	2.3	-	2.2 5	1.5	-	-	-	-	2.3 5				L3 App ly
2	18S45.3	Intrepret the usage of suitable software models	2.3 5	2.3 5	2.3 5	2.3	-	-	-	-	1.5	-	-	2.3 5				L3 App ly
2	18CS45.4	Compare various design techniques for software development.	2.3 5	2.3 5	2.3 5	2.3	-	-	-	-	1.5	-	-	2.3 5				L4 Ana lyze
3	18CS45.5	Illustrate the principles for validating the software requirements .	2.3 5	2.3 5	2.3 5	-	-	-	-	-	-	-	-	2.3 5				L3 App ly
3	18CS45.6	Examine the change requirements for software maintenance .	2.3 5	2.3 5	2.3 5	-	-	-	-	-	-	-	-	2.3 5				L4 Ana lyze
4	18CS45.7	Analyze the software project management plans	2.3 5	2.3 5	2.3 5	2.3	-	2.2 5	-	-	-	-	-	2.3 5				L4 Ana lyze
4	18CS45.8	Identify the quality assurance procedures	2.3 5	2.3 5	2.3 5	2.3	-	2.2 5	-	-	-	-	-	2.3 5				L2 Und erst and
5	18CS45.9	Understand the importance of agile project management	2.3 5	2.3 5	2.3 5	2.3	-	2.2 5	-	1	-	-	-	2.3 5				L2 Und erst and
5	18CS45.10	Explain the Agile method for Software Development .	2.3 5	2.3 5	2.3 5	2.3	-	2.2 5	-	1	-	-	-	2.3 5				L2 Und erst and
-	**18CS45**	**Average attainment (1, 2, or 3)**	**2.3 5**	**2.3 5**	**2.3 5**	**2.3**	**0**	**2.2 5**	**1.5**	**1**	**1.5**	**0**	**0**	**2.3 5**				**-**
-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*																

5. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Modules	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1	Software debugging	Extra class	2nd week of May 2019	Concerned faculty	L4
2	Software Engineering economics	Extra class	2nd week of May 2019	Concerned faculty	L2
3	Computing foundations	Extra class	3rd week of May 2019	Concerned faculty	L2
4	Relational databases	Extra class	3rd week of May 2019	Concerned faculty	L4
			4th 3rd week of May 2019		

6. Content Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Modules	Gap Topic	Area	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1	Requirement analysis for small-scale industry	Software development	Seminar	2nd week of May 2019	Concerned faculty	L4
2	Designing models for software	Software design	Seminar	2nd week of May 2019	Concerned faculty	L4
3	Automation testing	Software testing	Seminar	3rd week of May 2019	Concerned faculty	L4
4	software quality acceptance	Quality Management	Seminar	3rd week of May 2019	Concerned faculty	L4
5	Implementation of agile method	Software development	Seminar	4th 3rd week of May 2019		L2

C. COURSE ASSESSMENT

1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Modules	Title	Teach. Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Introduction and software process	10	2	-	-		1	2	CO1, CO2	4
2	Systems models and implementation	10	2	-	-	1		2	CO3, CO4	4
3	System testing and system evolution	10	-	2	-		1	2	CO5, CO6	4
4	Project planning and quality management	10	-	2	-	1		2	CO7, CO8	4
5	Agile software development	10	-	-	4	1		2	CO9, CO10	2
-	**Total**	**50**	**4**	**4**	**4**	**3**	**2**	**10**	**-**	**-**

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Modules	Evaluation	Weightage in Marks	CO	Levels
1, 2	CIA Exam – 1	30	CO1 , CO2,CO3 , CO4	L4, L3 , L3 , L4
3, 4	CIA Exam – 2	30	CO5 , CO6,CO7,CO8	L3 , L4 , L4, L2
5	CIA Exam – 3	30	CO9,CO10	L2 , L2
1, 2	Assignment - 1	10	CO1 , CO2,CO3 , CO4	L4, L3 , L3 , L4
3, 4	Assignment - 2	10	CO5 , CO6,CO7,CO8	L3 , L4 , L4, L2
5	Assignment - 3	10	CO9,CO10	L2 , L2
1, 2	Seminar - 1	00	-	-
3, 4	Seminar - 2	00	-	-
5	Seminar - 3	00	-	-
	Other Activities – define – Slip test	-	-	-

	Quiz - 3		-	-
1 - 5	Other Activities – Mini Project	-	-	-
	Final CIA Marks	**40**	**-**	**-**

D1. TEACHING PLAN - 1

Module - 1

Title:	Introduction and software process	Appr Time:	10 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Explore the various types of software system	CO1	L4
2	Identify the software development requirements	CO2	L3
b	***Course Schedule***	-	-
Class No	**Module Content Covered**	**CO**	**Level**
1	Introduction: Software Crisis, Need for Software Engineering	C01	L4
2	Professional Software Development	C01	L4
3	Case Studies , Software Engineering Ethics	C01	L4
4	Models: Waterfall Model	C01	L4
5	Incremental Model , Spiral Model	C01	L4
6	Process activities.	C01	L4
7	Requirements Engineering Processes , Requirements Elicitation and Analysis	CO2	L3
8	Functional and non-functional requirements	CO2	L3
9	The software Requirements Document , Requirements Specification	CO2	L3
10	Requirements validation .Requirements Management	CO2	L3
c	**Application Areas**	**CO**	**Level**
1	Software development industries	CO1	L4
2	Medicine manufacturing industries	CO2	L3
d	**Review Questions**	-	-
1	Explain requirement validation.	CO2	L3
2	Write short notes on Ethnography	CO2	L2
3	Distinguish between functional and non-functional requirements. With a block diagram	CO2	L2
4	Explain non-functional requirement types and Explain the metrics for specifying non-functional requirements	CO2	L2
5	What are professional and ethical responsibility of software engineering	CO1	L4
6	DDefine software Engineering. Explain the different types of software products	CO1	L4
7	What is a software process model	CO1	L4
8	What are key challenges facing software engineering	CO1	L4
e	**Experiences**	-	-
1			
2			
3			
4			
5			

Module – 2

Title:	Systems models and implementation	Appr Time:	10 Hrs
a	***Course Outcomes***	-	**Blooms**

-	The student should be able to:	-	**Level**
1	Intrepret the usage of suitable software models	CO3	L3
2	Compare various design techniques for software development.	CO4	L4
b	**Course schedule**	-	-
Class No	**Module Content Covered**	**CO**	**Level**
1	**Context models**	CO3	L3
2	Interaction models	CO3	L3
3	Structural models	CO3	L3
4	Behavioral models . Model-driven engineering.	CO3	L3
5	Introduction to RUP	CO4	L4
6	Design Principles. Object-oriented design using the UML	CO4	L4
7	Design patterns	CO4	L4
8	Implementation issues	CO4	L4
9	Configuration Management	CO4	L4
10	Open source development.	CO4	L4
c	**Application Areas**	**CO**	**Level**
1	Embedded and Real-Time Systems	CO3	L3
2	Real-Time Systems	CO4	L4
d	**Review Questions**	-	-
1	Write short notes on (I) Context models (ii) Structural models	CO3	L3
2	Explain the terms: (I) Unified Modeling language (ii) Sequence models	CO3	L3
3	Describe rational unified process with a block diagram	CO4	L3
4	List and explain different types of system		L3
5	What is a sequence model? Write the sequence model of operations in collecting the data from a weather station and explain	CO3	L3
6	Define object model and explain object aggregation.	CO3	L3
7	List the proposals made about how to identify object classes.	CO4	L4
8	With figure explain the phases of RUP.	CO4	L4
e	**Experiences**	-	-
1			
2			
3			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	17cs45	Sem:	4	Marks:	30	Time:	75 minutes
Course:	Software engineering						

-	**-**	**Note: Answer any 2 questions, each carry equal marks. Module : 1, 2**	**Marks**	**CO**	**Level**
1	a	With a neat diagram , explain the waterfall model of software development process	10	CO1	L4
	b	What is a requirement specification? Explain various ways of writing system requirements	5	CO2	L3
		OR			
2	a	With an example, explain the functional and non- functional requirements	10	CO2	L3
	b	Write block diagram for illustrating incremental development model . State at least two benefits and problems of incremental development model	5	CO1	L4

3	a	Explain briefly different types of system models that might be created during the system analysis phase	10	CO3	L3
	b	With a neat diagram , explain the rational unified process	5	CO4	L4
		OR			
4	a	Draw a context model for patient information system . How the interactions are modeled?	5	CO3	L3
	b	Explain use case model for weather station	5	CO3	L3
	c	Explain in detail the object identification process	5	CO4	L4

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	17cs45	Sem:	4	Marks:	10	Time:	90 – 120 minutes
Course:	Software engineering				Module : 1, 2		
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1		What are the fundamental activities of software engineering?	4M	CO1	L4
2		With a neat diagram , explain the waterfall model of software development process	10	CO1	L4
3		What is software? Explain the two fundamental types of software products	5	CO1	L4
4		What is a requirement specification? Explain various ways of writing system requirements	6	CO2	L3
5		Why the understanding of requirements from stake holders is a difficult task ? Explain	5	CO2	L3
6		Write block diagram for illustrating incremental development model . State at least two benefits and problems of incremental development model	6	CO2	L3
7		With an example, explain the functional and non- functional requirement	10	CO2	L3
8		Explain the IEEE standard format for requirement documentation	8	CO2	L3
9		Explain the requirements engineering process with a neat block diagram	10	CO2	L3
10		Explain the requirements elicitation and analysis phase, with spiral diagram. Give reasons why is it difficult phase in requirements engineering process	8	CO2	L3
11		Explain requirement validation.	10	CO2	L3
12		What are the attributes of good software. Explain	6	CO1	L4
13		Draw a context model for patient information system . How the interactions are modeled?	6	CO3	L3
14		Explain briefly different types of system models that might be created during the system analysis phase	10	CO3	L3
15		With a neat diagram , explain the rational unified process	6	CO4	L4
16		Explain use case model for weather station	5	CO4	L4
17		Explain in detail the object identification process	5	CO3	L3
18		Draw and explain sequence diagram for describing data collection in weather information system	8	CO3	L3
19		What is design pattern ? List and explain four essential elements of design pattern	6	CO4	L4
20		Write short note on open source development	8	CO4	L4
15		With a neat diagram , explain the rational unified process	6	CO4	L4
16		Explain use case model for weather station	5	CO4	L4
17		Explain in detail the object identification process	5	CO3	L3
18		Draw and explain sequence diagram for describing data	8	CO3	L3

		collection in weather information system			
19		What is design pattern ? List and explain four essential elements of design pattern	6	CO4	L4
20		Write short note on open source development	8	CO4	L4

D2. TEACHING PLAN - 2

Module – 3

Title:	System testing and system evolution	Appr Time:	10 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Illustrate the principles for validating the software requirements .	CO5	L3
2	Examine the change requirements for software maintenance .	CO6	L4
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	Development testing	CO5	L3
2	Development testing contnued	CO5	L3
3	System Testing	CO5	L3
4	Release Testing	CO5	L3
5	User testing	CO5	L3
6	Test Automation.	CO5	L3
7	Evolution processes and program evolution dynamics	CO6	L4
8	Program evolution dynamics and Software maintenance	CO6	L4
9	Maintenance prediction	CO6	L4
10	Legacy system management	CO6	L4
c	**Application Areas**	**CO**	**Level**
1	Safety-critical systems	CO5	L3
2	Business oriented systems	CO6	L4
d	**Review Questions**	-	-
1	Explain interface testing with neat diagram	CO5	L3
2	Explain component testing	CO5	L3
3	List classes of interface errors	CO5	L3
4	Define “program evolution dynamics”. Describe the Lehman’s laws for program evolution dynamics	CO6	L4
5	Explain the different types of software maintenance	CO6	L4
6	Explain the software evolution process	CO6	L4
7	Explain the performance testing	CO5	L3
8	Explain general model of testing with the help of a block diagram	CO5	L3
e	**Experiences**	-	-
1			
2			
3			
4			
5			

Module – 4

Title:	Project planning and Quality Management	Appr Time:	10 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Analyze the software project management plans	CO7	L4

2	Identify the quality assurance procedures	CO8	L2
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	Introduction to Project Planning and Software pricing	CO7	L4
2	Plan-driven development	CO7	L4
3	Project planning process	CO7	L4
4	Project scheduling	CO7	L4
5	Estimation techniques	CO7	L4
6	COCOMO Model Continued	CO7	L4
7	Software quality	CO8	L2
8	Software standards.	CO8	L2
9	Reviews and inspections	CO8	L2
10	Software measurement and metrics	CO8	L2
c	**Application Areas**	**CO**	**Level**
1	Service oriented architecture	CO7	L4
2	Manufacturing industries	CO8	L2
d	**Review Questions**	-	-
1	Explain briefly the algorithmic cost modeling and write the difficulties	CO8	L2
2	Explain different section of project plan and define milestones and deliverable.	CO7	L4
3	List and explain various COCOMO2 cost estimation models	CO7	L4
4	Explain the various inspection checklists for software inspection process	CO8	L2
5	Describe the cost estimation techniques with relevant example	CO8	L2
6	Write a note on project duration and staffing	CO7	L4
7	Name the type of metrics used to estimate productivity	CO8	L2
8	What are the factors affecting software pricing?	CO8	L2
e	**Experiences**	-	-
1			
2			
3			
4			
5			

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	17cs45	Sem:	4	Marks:	30	Time:	75 minutes		
Course:	Software engineering								
-	**-**	**Note: Answer any 2 questions, each carry equal marks. Module : 3, 4**					**Marks**	**CO**	**Level**
1	a	Explain with neat diagram the test driven development. Explain benefits of test driven development					10	CO5	L3
	b	List and explain LEHMAN'S law related to software evolution					5	CO6	L4
		OR							
2	a	With a neat diagram explain acceptance testing process					5	CO5	L3
	b	Explain the software engineering process with an illustrative figure					10	CO6	L4
3	a	Describe the COCOMO model of software cost estimation					10	CO7	L4
	b	With a neat diagram explain project planning process					5	CO7	L4
	c	Explain the various inspection checklist for software inspection process					5	CO8	L2
		OR							
4	a	Explain the features provided by the version management system					5	CO7	L4
	b	What is configuration management? State the four activities of configuration management.					5	CO8	L2

	c	Explain the factors to be considered for the approval of change.	5	CO8	L2

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	17cs45	Sem:	4	Marks:	10	Time:	90 – 120 minutes
Course:	Software engineering			Module : 3, 4			
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1		Write short notes on system testing , unit testing and component testing	10	CO5	L3
2		Explain with neat diagram the test driven development. Explain benefits of test driven development	10	CO5	L3
3		With a neat diagram explain acceptance testing process	8	CO5	L3
4		With a neat diagram explain software evolution process	8	CO6	L4
5		List and explain LEHMAN'S law related to software evolution	5	CO6	L4
6		Explain the software engineering process with an illustrative figure.	10	CO6	L4
7		List and explain distinct process matrix that can be used for assessing maintainability.	8	CO6	L4
8		Define validation and verification and explain two complementary approaches to system checking and analysis	10	CO7	L4
9		Explain in detail software inspection process	6	CO8	L2
10		With a neat diagram explain the debugging process	8	CO7	L4
11		Explain the factors to be considered for the approval of change	5	CO8	L2
12		Explain the features provided by the version management system	5	CO8	L2
13		What is configuration management? State the four activities of configuration management	6	CO8	L2
14		What is system building? State the features available in system building tools	10	CO8	L2
15		Explain the factors to be considered for release planning of system.	6	CO7	L4
16		What are product metrics? Explain its two classes of metrics	4	CO8	L2
17		Describe the COCOMO model of software cost estimation	10	CO7	L4
18		With a neat diagram explain project planning process	8	CO7	L4
19		Explain the various inspection checklist for software inspection process	6	CO8	L2
20		List and explain software quality attributes	5	CO8	L2

D3. TEACHING PLAN - 3

Module – 5

Title:	**Agile Software Development,Agile Methods**	Appr Time:	10 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Understand the importance of agile project management	CO9	L2
2	Explain the Agile method for Software Development .	CO10	L2
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	Coping with Change	CO9	L2

2	Incremental Delivery	CO9	L2
3	Plan-driven and agile development	CO9	L2
4	Testing in XP	CO9	L2
5	Pair programming	CO9	L2
6	Agile project management	CO10	L2
7	Scaling Agile Methods	CO10	L2
8	The Agile Manifesto: Values and Principles	CO10	L2
9	The Agile Manifesto: Values and Principles continued	CO10	L2
c	**Application Areas**	**CO**	**Level**
1	Agile software development	CO9	L2
2	Software industries using agile methods	CO10	L2
d	**Review Questions**	-	-
1	What is pair programming? Write its advantages	CO10	L2
2	What is extreme programming? List principles of agile method	CO10	L2
3	Explain extreme programming .	CO10	L2
4	What are agile methods? Describe the principles of agile method.	CO9	L2
5	List and explain the principles of agile methods.	CO9	L2
6	Also explain the problems with agile methods.	CO9	L2
7	Explain the difficulties with iterative development and incremental delivery.	CO9	L2
8	Briefly describe the extreme programming release cycle with a neat diagram.	CO10	L2
e	**Experiences**	-	-
1			
2			
3			
4			
5			

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	17cs45	Sem:	4	Marks:	30	Time:	75 minutes
Course:	Software engineering						

-	-	**Note: Answer any 2 questions, each carry equal marks. Module : 5**	**Marks**	**CO**	**Level**
1	a	List and explain the principles of agile methods. Also explain the problems with agile methods	10	CO9	L2
	b	Explain Agile Project Management.	5	CO10	L2
		OR			
2	a	Write breifly about the throw away prototype.	5	CO9	L2
	b	Explain SCRUM. Draw and explain block diagram for the SCRUM process . Mention the advantages of SCRUM	10	CO10	L2
3	a	Explain the difficulties with iterative development and incremental delivery	5	CO9	L2
	b	Draw a block diagram and explain the process of prototype development ? What are the benefits of prototype?	8	CO10	L2
		OR			
4	a	What is extreme programming? List principles of agile method	7	CO10	L2
	b	Explain the ways of coping with change and reduction of rework cost. How the agile methods are scaled ?	10	CO9	L2

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions

Crs Code:	17cs45	Sem:	4	Marks:	10	Time:	90 – 120 minutes
Course:	Software engineering				Module : 5		
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1		What is pair programming? Write its advantages	4	CO10	L2
2		What is extreme programming? List principles of agile method	6	CO10	L2
3		List and explain the principles of agile methods. Also explain the problems with agile methods.	10	CO9	L2
4		Explain the ways of coping with change and reduction of rework cost. How the agile methods are scaled ?	6	CO9	L2
5		Draw a block diagram and explain the process of prototype development ? What are the benefits of prototype?	8	CO10	L2
6		Write breifly about the throw away prototype	5	CO10	L2
7		Explain SCRUM. Draw and explain block diagram for the SCRUM process . Mention the advantages of SCRUM	10	CO10	L2
8		List all the four key features of testing in XP	2	CO9	L2
9		Explain the difficulties with iterative development and incremental delivery	6	CO9	L2
10		With a neat diagram explain plan driven and agile specification process	10	CO10	L2

F. EXAM PREPARATION

1. University Model Question Paper

Course:	Software engineering					Month / Year	May /2019
Crs Code:	17cs45	Sem:	4	Marks:	60	Time:	180 minutes

-	Note	Answer any FIVE full questions. All questions carry equal marks.	Marks	CO	Level
1	a	What are the fundamental activities of software engineering?	4M	CO1	L4
	b	With a neat diagram , explain the waterfall model of software development process	10	CO1	L4
	c	What is software? Explain the two fundamental types of software products	5	Co1	L4
	d	What is a requirement specification? Explain various ways of writing system requirements.	6	CO1	L4
		OR			
1	a	Why the understanding of requirements from stake holders is a difficult task ? Explain	5	CO2	L3
	b	Write block diagram for illustrating incremental development model . State at least two benefits and problems of incremental development model	6	CO2	L3
	c	With an example, explain the functional and non- functional requirement	10	CO2	L3
	d	Explain the IEEE standard format for requirement documentation	8	CO2	L3
2	a	Draw a context model for patient information system . How the interactions are modeled?	6	CO3	L3
	b	Explain breifly different types of system models that might be created during the system analysis phase	10	CO3	L3
	c	With a neat diagram , explain the rational unified process	6	CO3	L3
	d	Explain use case model for weather station	5	CO3	L3
		OR			
2	a	Explain in detail the object identification process	5	CO4	L4
	b	Draw and explain sequence diagram for describing data collection in weather information system	8	CO4	L4
	c	What is design pattern ? List and explain four essential elements of design pattern	6	CO4	L4

	d	Write short note on open source development	8	CO4	L4
3	a	Write short notes on system testing , unit testing and component testing	10	CO5	L3
	b	Explain with neat diagram the test driven development. Explain benefits of test driven development	10	CO5	L3
	c	With a neat diagram explain acceptance testing process	8	CO5	L3
	d	With a neat diagram explain software evolution process	8	CO5	L3
		OR			
3	a	List and explain LEHMAN'S law related to software evolution	5	CO6	L4
	b	Explain the software engineering process with an illustrative figure	10	CO6	L4
	c	List and explain distinct process matrix that can be used for assessing maintainability	8	CO6	L4
	d	Define validation and verification and explain two complementary approaches to system checking and analysis	10	CO6	L4
4	a	Explain the factors to be considered for the approval of change	5	CO7	L4
	b	Explain the features provided by the version management system	5	CO7	L4
	c	What is configuration management? State the four activities of configuration management	6	CO8	L2
	d	What is system building? State the features available in system building tools	10	CO7	L4
		OR			
4	a	Explain the factors to be considered for release planning of system	6	CO7	L4
	b	What are product metrics? Explain its two classes of metrics	4	CO8	L2
	c	Describe the COCOMO model of software cost estimation	10	CO8	L2
	d	With a neat diagram explain project planning process	8	CO7	L4
5	a	Explain Ahile Manifesto.	4	CO10	L2
	b	List all the four key features of testing in XP	2	CO9	L2
	c	List and explain the principles of agile methods. Also explain the problems with agile methods	10	CO9	L2
	d	Explain the ways of coping with change and reduction of rework cost. How the agile methods are scaled?	6	CO9	L2
		OR			
5	a	Draw a block diagram and explain the process of prototype development ? What are the benefits of prototype?	8	CO10	L2
	b	Write briefly about the throw away prototype	5	CO10	L2
	c	Explain SCRUM. Draw and explain block diagram for the SCRUM process . Mention the advantages of SCRUM	10	CO10	L2
	d	What is extreme programming? List principles of agile method	6	CO10	L2

2. SEE Important Questions

Course:	Software engineering					Month / Year	May /2019
Crs Code:	17cs45	Sem:	4	Marks:	60	Time:	180 minutes
	Note	Answer any FIVE full questions. All questions carry equal marks.				-	-
Module	Qno.	Important Question				**Marks**	**CO**	**Year**
1	1	Write block diagram for illustrating incremental development model . State at least two benefits and problems of incremental development model				6	CO1	L4
	2	With neat diagram explain water fall model for software development.				10	CO2	L3
	3	Explain the IEEE standard format for requirement documentation				8	CO2	L3
	4	Explain the requirements engineering process with a neat block diagram				10	CO2	L3
	5	Explain the requirements elicitation and analysis phase, with spiral diagram. Give reasons why is it difficult phase in requirements				8	CO2	L3

		engineering process			
2	1	Explain use case model for weather station	5	CO3	L3
	2	Explain in detail the object identification process	5	CO4	L4
	3	Draw and explain sequence diagram for describing data collection in weather information system	8	CO3	L3
	4	What is design pattern ? List and explain four essential elements of design pattern	6	CO4	L4
	5	Write short note on open source development	8	CO4	L4
3	1	Explain the software engineering process with an illustrative figure	10	CO6	L4
	2	List and explain distinct process matrix that can be used for assessing maintainability	8	CO6	L4
	3	Define validation and verification and explain two complementary approaches to system checking and analysis	10	CO5	L3
	4	Explain in detail software inspection process	6	CO6	L4
	5	Explain the test driven development.	8	CO5	L3
4	1	What are product metrics? Explain its two classes of metrics	4	CO8	L2
	2	Describe the COCOMO model of softwre cost estimation	10	CO8	L2
	3	With a neat diagram explain project planning process	8	CO7	L4
	4	Explain the various inspection checklist for software inspection process	6	CO8	L2
	5	With a neat diagram explain project planning process.	10	CO7	L4
5	1	Write breifly about the throw away prototype	5	CO10	L2
	2	Explain SCRUM. Draw and explain block diagram for the SCRUM process . Mention the advantages of SCRUM	10	CO10	L2
	3	List all the four key features of testing in XP	2	CO9	L2
	4	Explain the difficulties with iterative development and incremental delivery	6	CO9	L2
	5	Explain Agile Manifesto.	10	CO9	L2

G. Content to Course Outcomes

1. TLPA Parameters

Table 1: TLPA – Example Course

Module-#	Course Content or Syllabus (Split module content into 2 parts which have similar concepts)	Content Teaching Hours	Blooms' Learning Levels for Content	Final Blooms' Level	Identified Action Verbs for Learning	Instruction Methods for Learning	Assessment Methods to Measure Learning
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
1	Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies. Models: Waterfall Model , Incremental Model and Spiral Model . Process activities.	5	L4 Analyze	L4 Analyze	- Understand - Explore	Lecture	Slip test
1	Requirements Engineering Processes .Requirements Elicitation and Analysis . Functional and non-functional requirements . The software Requirements Document .Requirements Specification. Requirements validation .Requirements Management .	5	L3 Apply	L3 Apply	-Identify -	Explanation	Q & A
2	Context models . Interaction models Structural models . Behavioral models .	5	L3 Apply	L3 Appl	-Interpret -	Description	Q & A

	Model-driven engineering.			y			
2	Introduction to RUP , Design Principles. Object-oriented design using the UML. Design patterns. Implementation issues. Open source development.	5	L4 Analyze	L4 Analyze	-Compare-	Explanation	Q & A
3	Development testing, Test-driven development , Release testing , User testing. Test Automation.	5	L3 Apply	L3 Apply	-Illustrate-	Examine	Focused on analyzing / compare
3	Evolution processes . Program evolution dynamics. Software maintenance. Legacy system management	5	L4 Analyze	L4 Analyze	-Examine-	Description	Q & A
4	Software pricing . Plan-driven development. Project scheduling: Estimation techniques .	5	L4 Analyze	L4 Analyze	-Analyze-	Explanation	Slip test
4	Software quality. Reviews and inspections. Software measurement and metrics. Software standards.	5	L2 Understand	L2 Understand	-Identify-	Description	Q & A
5	Coping with Change , The Agile Manifesto: Values and Principles.	5	L2 Understand	L2 Understand	-Understand-	Develop	Q & A
5	SCRUM and Extreme Programming. Plan-driven and agile development . Agile project management , Scaling agile methods	5	L2 Understand	L2 Understand	-Explain-	Description	Q & A

2. Concepts and Outcomes:

Table 1: Concept to Outcome – Example Course

Module-#	Learning or Outcome from study of the Content or Syllabus	Identified Concepts from Content	Final Concept	Concept Justification (What all Learning Happened from the study of Content / Syllabus. A short word for learning or outcome)	CO Components (1.Action Verb, 2.Knowledge, 3.Condition / Methodology, 4.Benchmark)	Course Outcome **Student Should be able to ...**
A	*I*	*J*	*K*	*L*	*M*	*N*
1	- Software Crisis, Need for Software Engineering. Professional Software Development , Software Engineering Ethics. Case Studies. Models: Waterfall Model , Incremental Model and	- Software process -	Software lifecycle	Software process activities	-Explore -software system, component or process -system models -realistic constraints.	Explore the various types of software system

	Spiral Model . Process activities					
1	- Requirements Engineering Processes .Requirements Elicitation and Analysis . Functional and non-functional requirements . The software Requirements Document .Requirements Specification. Requirements validation .Requirements Management .	- Requirement Analysis -	Software Requirement Specifications	Requirement Analysis	-Identify -requirements for software development, - Requirements Engineering Processes.	Identify the software development requirements
2	-Context models . Interaction models Structural models . Behavioral models . Model-driven engineering.	-Model driven engineering	System Models	Development models	-Interpret -Analysis of requirements - appropriate software design	Interpret the usage of suitable software models
2	-Introduction to RUP , Design Principles. Object-oriented design using the UML. Design patterns. Implementation issues. Open source development.	-Design Analysis -	Software Design and implementation	Design techniques	-Compare -software development -Design techniques,	Compare various design techniques for software development.
3	- Development testing, Test-driven development , Release testing , User testing. Test	-Test driven development -	Software Testing	Levels of software testing	-Illustrate -software requirements and software maintenance practices -Validating	Illustrate the principles for validating the software requirements .

	Automation.					
3	-Evolution processes . Program evolution dynamics. Software maintenance. Legacy system management	-Evolution process -	Software evolution	Evolution process	-Examine -Software Maintenance -Change requirement	Examine the change requirements for software maintenance .
4	-Software pricing . Plan-driven development. Project scheduling: Estimation techniques	-Plan driven developm ent -	Software plan	Development panning	-Analyze -software project management -quality assurance procedures	Analyze the software project management plans
4	-Software quality. Reviews and inspections. Software measuremen t and metrics. Software standards.	-Software quality -	Quality management	Quality assurance procedures	-Identify -Software development process -Quality assurance procedures	Identify the quality assurance procedures
5	-Coping with Change , The Agile Manifesto: Values and Principles.	-Agile project managem ent -	Agile project management	Agile methods for software development	-Understand -Software Development -Agile project management	Understand the importance of agile project management
5	-SCRUM and Extreme Programming . Plan-driven and agile development . Agile project management , Scaling agile methods	-Agile method	SCRUM	Agile methods for software development	-Explain,Software development -Agile methods	Explain the Agile method for Software Development .