Programme : Diploma in Information Technology and Computer Engineering (Sandwich Pattern)	
Course Code:IT23	**Course Title: Software Engineering**
Compulsory / Optional: Compulsory	

Teaching Scheme and Credits						**Examination Scheme**							
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**		**SA-TH (3Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
										PR	**OR**		
3		-	1	4	2	20	20	60	-	-	-	25	125

Total IKS Hrs. for course:

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @$ Internal Online Examination

Note:
1. FA-TH represents an average of two class tests of 30 marks each conducted during the term.
2. SA-TH represents the end term examination.

I. Rationale

Software Engineering is an engineering discipline that is concerned with all aspects of software production. Further it is the systematic application of scientific and technological knowledge, methods, and experience to the design, implementation, testing, and documentation of software. This course intends to develop a systematic, disciplined approach to the development, operation, and maintenance of software and help students to get acquainted with latest trends in Software Engineering.

Industry / Employer Expected Outcome

Students should be able to understand software development models.

II. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Understand the basics of Software Engineering.
CO2	Identify suitable process model for software development.
CO3	Understand importance of Agile Methodology.
CO4	Apply Software Engineering principles at various stages of Software Development.
CO5	Use software modelling to create data designs.
CO6	Apply project management principles for software development.

Course Content Details:

Unit No.	Theory Learning Outcomes (TLO's)aligned to CO's	Topics / Sub-topics
1	**TLO 1.1:** Introduce software **TLO 1.2:** Describe Characteristics of software and its application **TLO 1.3:** Explain the different types of software **TLO 1.4:** Introduce software engineering with its needs **TLO 1.5:** Describe A Layered Approach of software Engineering **TLO 1.6:** Explain software Development Generic Process Framework **TLO 1.7:** Describe terminologies related to software engineering	**Overview of Software Engineering** 1.1 Definition of Software 1.2 Software Characteristics, Software Application, Software myths 1.3 Types of Software 1.4 Software Engineering- Definition, Need 1.5 Software Engineering- A Layered Approach 1.6 Software Development Generic Process Framework- Typical Umbrella Activities. Identifying A Task Set 1.7 Some Terminologies : Product and Process, Module and Software Components, Deliverables and Milestones **Course Outcome- CO1 Teaching Hours – 07 Marks 08**
2	**TLO 2.1:** Describe Personal and Team Process Models **TLO 2.2:** Describe Waterfall Model **TLO 2.3:** Describe V model **TLO 2.4:** Describe Incremental process Model **TLO 2.5:** Describe Evolutionary Process Model **TLO 2.6:** Explain Selection criteria for software process model	**Process Models** 2.1 Personal and Team Process Models (PSP and TSP) 2.2 Waterfall Model 2.3 V Model 2.4 Incremental Process Model 2.5 Evolutionary Process Model: Prototyping 2.6 Selection criteria for software process model. **Course Outcome- CO2 Teaching Hours – 06 Marks 10**
3	**TLO 3.1:** Describe Agile software methodology with its importance **TLO 3.2:** Describe Adaptive Software Development **TLO 3.3:** Explain Agile Process Model **TLO 3.4:** Explain Dynamic Systems Development Method **TLO 3.5:** Introduce DevOps **TLO 3.6:** Describe JIRA	**Agile Methodology** 3.1 Agile Software Methodology: What is Agile Methodology , Importance of Agile Methodology , Difference between Prescriptive and Agile Process Model , Agility Principles 3.2 Adaptive Software Development 3.3 Agile Process Model: Scrum Process Flow 3.4 Dynamic Systems Development Method (DSDM) 3.5 Introduction to DevOps 3.6 JIRA 3.7 **Course Outcome- CO3 Teaching Hours – 08 Marks 10**

4	**TLO 4.1:** Explain core principles of software engineering. **TLO 4.2:** Describe requirement engineering **TLO 4.3:** Explain different types of requirements **TLO 4.4:** Describe software requirement specification with its need and characteristics	**Software Requirement Engineering** 4.1 Software Engineering Practices and its importance, Core principles, Communication Practices, Planning Practices, Modelling Practices, Construction Practices, Software Deployment (Statement and meaning of each principle) 4.2 Requirement Engineering: Requirement Gathering and Analysis. 4.3 Types of Requirements (Functional, Product, organizational, External Requirements), Eliciting Requirements, Developing Use cases, Building requirement models, Requirement Negotiation, Validation. 4.4 Software Requirement Specification: Need of SRS, Format, and its Characteristics. **Course Outcome- CO4 Teaching Hours – 07 Marks 12**
5	**TLO 5.1:** Explain translation of requirement model into Design model **TLO 5.2:** Describe elements of analysis model **TLO 5.3:** Describe concepts of design modelling **TLO 5.4:** Describe notations used in data flow diagram **TLO 5.5:** Explain testing, methods and levels. **TLO 5.6:**. Describe Contents of test documentation.	**Software Modelling and Design** 5.1 Translating Requirement Model into Design Model: Data Modelling. 5.2 Analysis Modelling: Elements of Analysis model. 5.3 Design Modelling: Fundamental Design Concept (Abstraction, Information hiding, Structure, Modularity, Concurrency, Verification, Aesthetics) 5.4 Design Notations: Data Flow Diagram (DFD), Structured Flowcharts and Decision Tables 5.5 Testing- Meaning and purpose, Testing methods - Black-box and White-box, Level of Testing- Unit Testing, Integration Testing, User Acceptance Testing 5.6 Test Documentation- Test Case Template, Test plan, Introduction to defect report, Test Summary Report **Course Outcome- CO5 Teaching Hours – 10 Marks 12**
6	**TLO 6.1:** Describe 4P's of management spectrum **TLO 6.2:** Explain metrics for size estimation **TLO 6.3:** Describe construction cost model **TLO 6.4:** Explain Risk mitigation, monitoring, management plan **TLO 6.5:** Describe testing methods for DevOps.	**Software Project Management** 6.1 The management spectrum-4P's 6.2 Metrics for Size Estimation: Line of Code (LoC), Function Points (FP). 6.3 COCOMO (Constructive Cost Model) 6.4 Risk Management: Risk Identification, Risk Assessment, RMMM Strategy. 6.5 DevOps testing methods. **Course Outcome- CO6 Teaching Hours:07 Marks 08**

III. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

IV. Assessment

Methodologies/Tools

Formative assessment (Assessment for Learning)

Summative Assessment (Assessment of Learning)

End term examination, Viva-voce, Workshop performance (__marks)

I. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	**Overview of Software Engineering**	2	2	4	8
2	**Process Models**	0	4	6	10
3	**Agile Methodology**	2	2	6	10
4	**Software Requirement Engineering**	2	4	6	12
5	**Software Modelling and Design**	2	6	4	12
6	**Software Project Management**	2	2	4	8
	Total	**10**	**20**	**30**	**60**

COs - POs Matrix Form

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO - 1	PSO - 2	PSO - 3
CO1	3	-	-	-	-	-	-	-	-	-
CO2	3	-	-	2	-	-	1	3	-	-
CO3	3	3	3	3	3	1	1	3	2	-
CO4	3	3	3	3	3	1	1	-	2	2
CO5	3	-	3	2	-	-	-	3	-	2
CO6										

Legends: - High:03, Medium:02, Low:01, No Mapping: --

II. Suggested Learning Materials / Books

Sr. No	Author/ Publisher	Title	ISBN
1	Software Engineering A Practitioner's Approach	Roger Pressman	9780078022128
2	Fundamentals of Software Engineering	Rajib Mall	9788120348981
3	Software Engineering Concepts	Richard Fairly	9780074631218
4	Software Engineering principles and practices	Deepak Jain	9780195694840

III. Learning Websites & Portals

Sr. No	Link / Portal
1	**https://www.tutorialspoint.com/software_engineering/index.html**
2	**http://www.rspa.com/spi/**
3	**https://nptel.ac.in/courses/106101061**
4	**https://www.sei.cmu.edu/**

IV. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Ms. Ruchira Warekar	Visiting Lecturer	Government Polytechnic Mumbai
2	Ms. Namrata A. Wankhade	Lecturer	Government Polytechnic Mumbai
3	Mr. Abhishek Rai	Associate Software Engineer	Veritas Pvt Ltd Pune

Coordinator,
Curriculum Development,
Department of _____ Engineering

Head of Department
Department of _____ Engineering

I/C, Curriculum Development Cell

Principal