



**GANPAT
UNIVERSITY**

FACULTY OF COMPUTER APPLICATIONS

Programme	Master of Computer Applications					Branch / Spec.	Computer Application		
Semester	II					Version	1.0.0.0		
Effective from Academic Year				2026-27		Effective for the batch Admitted in			July 2026
Subject Code	P12A1SEA		Subject Name			Software Engineering and Agile			
Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CIA	S E E	Total
	L	TU	P	T					
Credit	2	0	1	0	3	Theory	40	60	100
Hours	2	0	2	0	4	Practical	20	30	50
Objective:									
This course equips students with foundational software engineering principles, process models, DevOps trends, and modern Requirements Engineering techniques. It further develops expertise in Agile frameworks, architectural styles, SOLID design patterns, and hands-on practices like TDD, BDD, and quality assurance.									
Pre-requisites:									
Basic knowledge of Object-Oriented Programming (OOP) concepts and Fundamental understanding of computer science principles and software development basics.									
Course Outcomes :									
1 = Slight (Low); 2 = Moderate (Medium); 3 = Substantial (High); “-” = No Correlation									
Name of CO	Description								
CO1	Apply Modern Process Models and Requirements Engineering								
CO2	Execute Agile Project Management Practices								
CO3	Design Software Architectures and Design Patterns								
CO4	Deploy Agile Technical Practices and Quality Assurance								

Mapping of CO and PO									
	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
	CO1	2	3	2	3	2	2	1	2
	CO2	1	3	2	2	3	3	2	3
	CO3	3	2	3	3	1	1	1	2
	CO4	3	2	3	3	2	2	2	3

Content:

Unit	SECTION-I	Hrs
1	Foundations of Modern Software Engineering & Processes: Core Concepts: Dualities of software development; Software Process Models (Waterfall, Incremental, Evolutionary, V-Model); Process Assessment & Improvement (CMMI, ISO 9001). Modern Process Trends: DevOps integration, Continuous Integration/Continuous Deployment (CI/CD) pipelines, Infrastructure as Code (IaC) principles. Requirements Engineering: Advanced elicitations, Goal-Oriented Requirements Engineering (GORE), Requirements Prioritization techniques (MoSCoW, Kano Model), formal specification modeling.	7
2	Agile Frameworks & Project Management: Agile Core: The Agile Manifesto principles & mindset; Comparison of Predictive vs. Adaptive life cycles. Scrum Framework: Roles (Product Owner, Scrum Master, Developers), Artifacts (Product Backlog, Sprint Backlog, Increment), Events (Sprint Planning, Daily Stand-up, Sprint Review, Retrospective). Lean & Kanban: Work-In-Progress (WIP) limits, Value Stream Mapping, Cumulative Flow Diagrams (CFD). Scaling Agile: Introduction to Scaled Agile Framework (SAFe), Large-Scale Scrum (LeSS), and Nexus.	8
	SECTION-II	
3	Software Architecture & Design Patterns: Architectural Styles: Monolithic, Microservices, Event-Driven, Domain-Driven Design (DDD), Serverless architectures. Object-Oriented Design & SOLID Principles: Single Responsibility, Open-Closed, Liskov Substitution, Interface Segregation, Dependency Inversion. Design Patterns: GoF (Gang of Four) patterns categorized into Creational, Structural, and Behavioral; Refactoring legacy codebases safely.	7
4	Agile Technical Practices & Software Quality: Extreme Programming (XP) Practices: Test-Driven Development (TDD) cycle (Red-Green-Refactor), Pair Programming, Continuous Refactoring, Behavior-Driven Development (BDD). Software Quality & Testing: Verification vs. Validation; Static Analysis; Dynamic Testing (Unit, Integration, System, Acceptance); Automated Testing Strategies & Test Pyramids. Quality Assurance: Software Metrics (Cyclomatic Complexity, Coupling/Cohesion, Technical Debt estimation).	8

Practical Content:

List of programs specified by the subject teacher based on above mentioned topics.

Text Books:

1	<i>Software Engineering: A Practitioner's Approach</i> (9th/10th Edition) by Roger S. Pressman and Bruce R. Maxim (McGraw-Hill).
2	<i>Agile Software Development, Principles, Patterns, and Practices</i> by Robert C. Martin (Pearson).
3	<i>Software Engineering</i> (10th Edition) by Ian Sommerville (Pearson).

MOOC/Certification Courses:	
1	SWAYAM / NPTEL Course: Software Engineering, Instructor: Prof. Rajib Mall (IIT Kharagpur) nptel.ac.in/courses/106105182
2	SWAYAM / NPTEL Course: Agile Software Development & Project Management
3.	Coursera / University of Minnesota: <i>Software Development Lifecycle Specialization</i>
4	edX / TU Delft: <i>Agile Software Development Professional Certificate</i>
5.	https://agilealliance.org/agile101/

Question Paper Scheme:

University Examination Duration: 3 Hours

Note for Examiner: -

(I) Questions 1 and 4 are compulsory with no options.

(II) Internal options should be given in questions 2, 3, 5 and 6.

SECTION – I

Q.1 –8 Marks

Q.2 –11 Marks

Q.3 –11 Marks

SECTION - II

Q.4 –8 Marks

Q.5 –11 Marks

Q.6 –11 Marks