Name of the Course: Software Engineering

Sr. No.	Heading	Particulars
1	**Description the course:**	**Introduction:** Software Engineering is the foundation for systematic software development. It introduces learners to the lifecycle of software—from planning and modeling to development and testing. The course provides a disciplined approach to creating software that meets user needs and performs reliably under real-world conditions. **Relevance:** In today's digital age, software is integral to almost every sector. This subject is crucial as it prepares students to handle increasing software complexity and ensures they understand the importance of process-driven development and quality standards. **Usefulness:** The course equips students with practical tools and methodologies for planning, estimating, designing, and testing software. It fosters analytical thinking and technical communication, which are vital for handling real-life software projects effectively and efficiently. **Application:** Software Engineering principles are applied in various domains—banking, healthcare, education, mobile app development, and more. The skills learned here help in managing full-scale projects, ensuring user satisfaction and product scalability. **Interest:** The course offers engaging content like UML modeling, agile methods, risk management, and testing strategies. Students enjoy applying these concepts through diagrams, real-world case studies, and collaborative project planning. **Connection with Other Courses:** This subject ties well with courses in Object-Oriented Programming, Database Management, and Final Year Projects. It bridges theoretical knowledge with project execution skills, enhancing overall technical competence. **Demand in the Industry:**

		There is a high demand for software professionals who understand both development and project management. Agile development, DevOps, and software quality assurance are key skills sought by employers globally. **Job Prospects:** Completing this course opens doors to roles such as software developer, quality analyst, system designer, project assistant, and scrum team member. With experience, one can grow into roles like project manager, solution architect, or process consultant.
2	**Vertical:**	Major
3	**Type:**	Theory
4	**Credits:**	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives (CO):** **CO 1.** Provide foundational knowledge of software engineering processes, models, and methodologies. **CO 2.** Introduce software requirements analysis and system modeling using UML. **CO 3.** Explain software design principles, project estimation, and scheduling techniques. **CO 4.** Familiarize students with software quality assurance, risk management, and configuration control. **CO 5.** Enable understanding of software testing principles and test-case design techniques.	
8	**Course Outcomes (OC):** After successful completion of this course, students would be able to - **OC 1.** Explain software process models and apply suitable models to project scenarios. **OC 2.** Analyze software requirements and create UML-based system models. **OC 3.** Apply design principles and estimation techniques for software development. **OC 4.** Plan, schedule, and manage software projects effectively using industry practices. **OC 5.** Demonstrate understanding of quality assurance and perform software testing using appropriate methods.	

9	**Modules:-** **Module 1 (15 hours):**
	Introduction to Software Engineering: Nature of Software, Software Engineering: Principles and Practice, Software Process Framework, Layered Technology, Process Framework, Process Patterns, Capability Maturity Model (CMM), Process Assessment **Software Development Models:** Prescriptive Models: Waterfall, Incremental, Rapid Application Development (RAD), Evolutionary Models: Prototyping, Spiral Model, Specialized Models: Component-Based Development, Aspect-Oriented Development, Agile Development: Agile Manifesto, Extreme Programming (XP), Scrum Overview **Requirements Engineering and Analysis:** Requirements Engineering Process, Elicitation Techniques (Interviews, Workshops, Use Cases), Components & Characteristics of a Software Requirements Specification (SRS), Validation of Requirements **System and Object-Oriented Modeling (using UML):** Use Case Diagram, Class Diagram, Sequence Diagram, Activity Diagram, State Chart Diagram, Component & Deployment Diagram
	Module 2 (15 hours):
	Software Design and Architecture: Design Principles: Coupling and Cohesion, Functional-Oriented vs. Object-Oriented Design, System Architecture Design, Design Verification and Validation, Monitoring and Control in Design **Software Metrics and Estimation:** Software Measurement: LOC, Function Point, and Use Case-Based Estimations, Object-Oriented Metrics, Empirical Estimation Models, Introduction to COCOMO II, Estimation in Agile Development, Make/Buy Decision **Software Project Management:** Project Planning: Scope, Feasibility, Resource Estimation, Project Scheduling: Effort Estimation, Time-Line Charts, Gantt Charts, Risk Management: Identification, Projection, RMMM Plan **Software Quality Assurance & Testing:** SQA Activities, Software Reviews, Formal Technical Reviews (FTR), Software Reliability and SQA Plan, Verification & Validation, Testing Principles and Objectives, Test Oracles, Levels of Testing, White-box and Black-box Testing, Test Plan and Test Case Design
10	**Text Books** 1. Software Engineering, A Practitioner's Approach, Roger S, Pressman, 2019 2. Software Engineering: principles and Practices, Deepak Jain, OXFORD University Press, 2008
11	**Reference Books** 1. Software Engineering, Ian Sommerville, Pearson Education, 2017 2. Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI, 2018

	3. Software Engineering: Principles and Practices, Hans Van Vliet, John Wiley & Sons, 2010 4. A Concise Introduction to Software Engineering, Pankaj Jalote, Springer	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%**