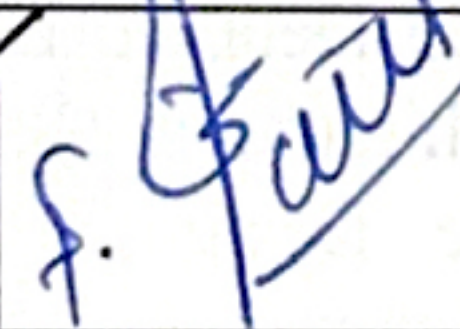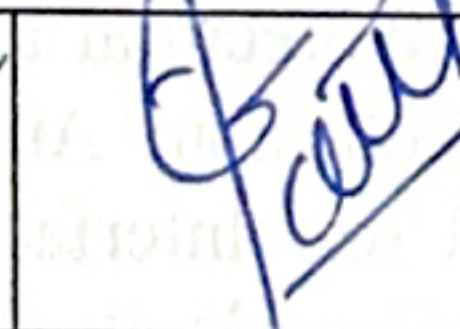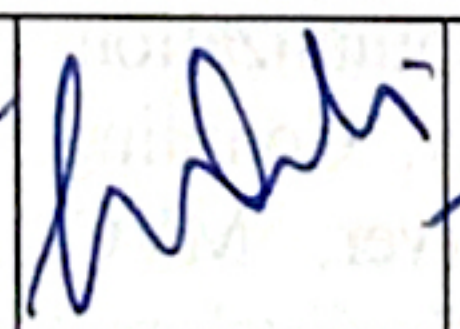# Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur- 441108

NAAC Accredited (A+ Grade)

## An Autonomous Institute affiliated to RTMNU Nagpur

### Fourth Year (Semester-IV) B.Tech. (CSE)

### Course Code: BCS32421 (Software Engineering) (Minor)

| Teaching Scheme | | | Examination Scheme | |
|---|---|---|---|---|
| Lectures | 3 Hrs/week | | CT-1 | 15 Marks |
| Tutorial | - | | CT-2 | 15 Marks |
| Total Credit | 3 | | CA | 10 Marks |
| | | | ESE | 60 Marks |
| | | | Total | 100 Marks |
| | | | Duration of ESE: 03Hrs 00Min. | |

## Course Objective:

| | |
|---|---|
| 1 | To develop an understanding of software project planning, including estimation, scheduling, and resource allocation. |
| 2 | To enable students to use project estimation models such as COCOMO and Function Point Analysis effectively. |
| 3 | learners identify project risks and apply structured risk management techniques. |
| 4 | To provide knowledge of Software Configuration Management (SCM) for version control, change management, and project tracking. |
| 5 | To introduce emerging trends such as DevOps, CI/CD, cloud-based software engineering, and AI applications in modern software development. |

## Course Contents

| | |
|---|---|
| Unit I | **Definition and Nature of Software:** Software Characteristics, Software Engineering: Objectives, Scope, and Importance, Software Process Models: Waterfall, Incremental, Spiral, V-Model, Agile Development, DevOps Overview, Software Life Cycle Phases, Software Engineering Ethics, Case Study: Agile Methodology in Real Projects |
| Unit II | **Requirement Engineering Process:** Elicitation, Analysis, Specification, Validation , SRS (Software Requirement Specification): Structure, Characteristics, and IEEE Standard, Functional and Non-Functional Requirements, Use Case Modeling, UML Diagrams (Use Case, Class, Activity, Sequence), Requirement Traceability Matrix (RTM) |
| Unit III | **Software Design Process:** Conceptualization, Architectural and Detailed Design, Design Concepts: Abstraction, Modularity, Coupling, Cohesion, Architectural Design Patterns: Layered Architecture, Client-Server, MVC, User Interface Design: Principles and Prototyping, Software Metrics: LOC, Cyclomatic Complexity, Function Point |
| Unit IV | **Software Quality:** Factors, Assurance, and Standards (ISO 9001, CMMI), Testing Fundamentals: Verification vs Validation, Levels of Testing: Unit, Integration, System, Acceptance, Black Box and White Box Testing Techniques, Test Case Design, Test Automation Tools (Selenium, JUnit), Software Maintenance and Re-engineering |
| Unit V | **Project Planning, Estimation:** (COCOMO, Function Point Analysis), Scheduling, Risk Management, and Resource Allocation, Software Configuration Management (SCM), Project Tracking and Metrics, Emerging Trends: DevOps, Continuous Integration/Deployment (CI/CD), Cloud-based Software Engineering, AI in SE |

## Text Books

| | |
|---|---|
| T1 | **Pressman, R. S., & Maxim, B. R.** — *Software Engineering: A Practitioner's Approach*, McGraw-Hill. |
| T2 | Pankaj Jalote — Software Engineering, Wiley Eastern. |

## Reference Books

| R1 | Carlo Ghezzi, Mehdi Jazayeri — *Fundamentals of Software Engineering*, Pearson. |
| R2 | James F. Peters & Witold Pedrycz — *Soft Computing in Software Engineering*, Wiley. |

## Useful Links

| 1 | https://nptel.ac.in/courses/106105087 |
| 2 | https://www.computer.org/education/bodies-of-knowledge/software-engineering |

| Sr. no. | Course Outcomes | CL | Class Session |
|---------|-----------------|----|---------------|
| 1 | **Understand** software project planning concepts, including estimation, scheduling, and resource allocation. | 2 | 9 |
| 2 | **Apply** project estimation models such as COCOMO and Function Point Analysis for accurate planning. | 2 | 9 |
| 3 | **Identify** project risks and implement structured risk management techniques. | 5 | 9 |
| 4 | **Utilize** Software Configuration Management (SCM) tools for version control, change management, and project tracking. | 6 | 9 |
| 5 | **Evaluate** emerging trends in software engineering, including DevOps, CI/CD, cloud-based development, and AI applications | 6 | 9 |

| Chairman | Dean Academics | Vice Principal (Academics) | Principal | Date of Release | Version | |
|----------|----------------|----------------------------|-----------|-----------------|---------|--|
| | | | | Apr. , 2025 | 1.00 | Applicable for AY 2025-26 Onwards |

HOD

Premanand Naktode