School of Computer Science & Information Technology, DAVV, Indore

CS-4305: SOFTWARE ENGINEERING

Semester II

Faculty Name: Dr. Ugrasen Suman

Course Objectives:

1. Explain the importance and activities of Software Engineering.
2. Describe various process models and their applications.
3. Demonstrate project planning and management activities in order to manage and estimate software projects.
4. Discuss structured and object oriented analysis & design methodologies.
5. Illustrate and explain various testing methods to develop industrial quality software.
6. Explain various attributes and models of quality and ways to achieve the desired quality.

UNIT-I

Introduction to Software Engineering and Software Processes: Software, Software Classifications and Characteristics, Software Crisis, What is Software Engineering? Software Engineering Challenges. Software Processes: Elements and Characteristics of Process model, Process Classification, Software Development Processes: SDLC, Waterfall, Iterative Waterfall, Prototyping, Incremental, Spiral, RAD, RUP process model, Software reuse process, Agile Software Development: Principles, Practices & Methods; etc. CASE Environment.

UNIT-II

Project Management and Planning: Project management essentials, Project success and failures, Project Life Cycle, Project team structure and organization, Software Configuration Management, Risk Management. Project planning activities: Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques, Staffing and Personnel Planning, Project Scheduling and Miscellaneous Plans.

UNIT-III

Requirements Engineering: Software Requirements, Requirements Engineering Process, Requirements Elicitation. Requirements Analysis: Structured Analysis, Object-oriented Analysis. Requirements Specification, Requirements Validation, and Requirements Management.

UNIT-IV

Software Design and Coding: Software Design Process, Characteristics of a Good Design**,** Design Principles, Modular Design (Coupling and Cohesion). Software Architecture. Design Methodologies: Function-oriented Design (Structured Design Methodology) and Object-oriented Design using UML, Logical Design. Coding process, Code verification and documentations.

UNIT-V

Software Testing, Quality and Maintenance: Testing Fundamentals, Test Planning, Black-Box Testing, White-Box Testing, Levels of Testing, Usability Testing, Regression Testing, Program Slicing, Debugging Approaches. Quality Concept, Quality Factors, Verification and Validation, Quality Assurance Activities, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six

Sigma. Best practices of Software Engineering. Software Reliability, Software Maintenance, Evolution, and Reengineering.

Text Books:

1. *Software Engineering: Concepts & Practices*- **Ugrasen Suman**, *Cengage Learning, 2nd Edition, 2022.*
2. *Object Oriented Analysis and Design Using UML,* **Ugrasen Suman** *et al, Cengage Learning, First Edition, 2018.*

Reference Books:

1. *An Integrated Approach to Software Engineering*- **Pankaj Jalote**, Narosa Publishing House.
2. *Software Engineering-A practitioner's approach*- **R. S. Pressman**, Tata McGraw-Hill International Editions, New York.
3. *Object Oriented Analysis and Design with Applications*-**Grady Booch**, Addision Wesley.
4. *Fundamentals of Software Engineering*-**Rajib Mall**, PHI, New Delhi.
5. *Object Oriented Modeling and Design Using UML*-**James Rambaugh,** Pearson Education.