Course Name : Computer Engineering Group

Course Code : CO/CD/CM/CW/IF

Semester : Fifth for CO/CM/IF/CW and Sixth for CD

Subject Title : Software Engineering

Subject Code : 17513

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	--	03	100	--	--	--	100

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

Today, Computer Software is the most important technology on the world stage. Software Engineering is the basis for Software development. Software Engineering helps pave a path towards easier, faster, and less expensive methods to build and maintain high quality softwares.

Software Engineering is about imagination and creativity, the process of creating something apparently tangible from nothing. It presents a framework for the Software Engineers that provides a road-map for building high quality software products, within time and cost constraints.

This Subject helps the students to wonderfully blend the knowledge they have acquired from the First Semester to the Fifth Semester into a practically feasible creative concept. The students will then be able to convert this creative concept/idea into commercially viable product in the Sixth Semester under the head Industrial Project.

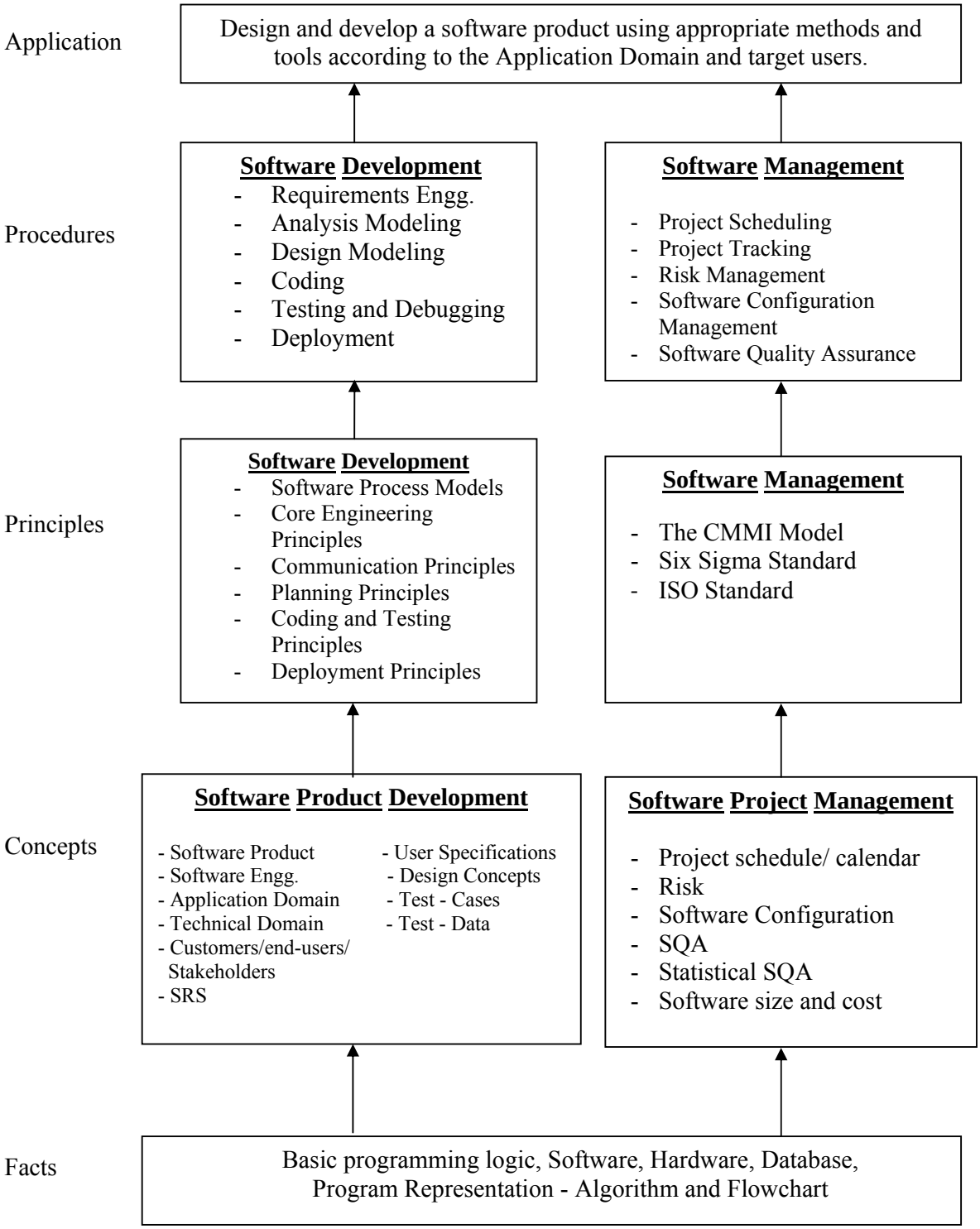
Objectives:

To develop following skills:

Intellectual Skills:

1. To develop awareness about the concepts of Software Development Life Cycle (SDLC).
2. To develop scientific and engineering approach towards software product development.
3. To develop both, the technical skills as well as managerial skills needed for software development.
4. Understand to conceive, plan, design, develop, and deploy software projects.
5. To be able to implement new ideas into real product.

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	**Overview Of Software Engineering And The Software Development Process** **Objectives:-** ➢ To understand meaning of Software and the types of Software. ➢ To understand the Software Engineering approach and its need ➢ To understand role of a software process and a process model in a software project. ➢ To understand various activities in the Software Process. ➢ To know various models for the Software development process. 1.1 Definition of Software and Characterstics of Software 1.2 Types / Categories of Software 1.3 Software Engineering – Definition, Need 1.4 Relationship between Systems Engineering and Software Engineering 1.5 Software Engineering- A Layered Technology Approach 1.6 Software Development Generic Process Framework- Software Process, Software Product, Software Work-Product, Basic Framework Activities, Umbrella Activities 1.7 Personal and Team Process Models (PSP and TSP) – Concept, Significance with respect to Ongoing Process Improvement, Goals, List of framework activities included 1.8 Prescriptive Process Models- • The Waterfall Model (Nature, Situations in which applicable with example, Associated Problems) • The Incremental Model (Nature, Situations in which applicable with example, General steps, Drawbacks) • RAD Model (Nature, Situations in which applicable with example,General steps, Drawbacks) • Prototyping (Nature, Situations in which applicable with example, General steps, Drawbacks) • Spiral Model (Nature, Situations in which applicable with example, General steps, Advantages, Disadvantages) 1.9 Agile Software Development – • Difference between Prescriptive and Agile Process Model • Features of the Agile Software Development Approach • Concept of Extreme Programming.	08	20

02	**Software Engineering Practices And Software Requirements Engineering** **Objectives:-** ➢ To become familiar with the standard Software Engineering Practices. ➢ To understand to carry out Requirements Engineering Tasks. ➢ To understand the importance of the SRS Document in the software Project. 2.1 Software Engineering Practices - Definition, Importance, Essence 2.2 Core Principles of Software Engineering (Statements & Meaning of each Principle) 2.3 Communication Practices (Concept, Need of Communication, Statements and Meaning of each principle) 2.4 Planning Practices (Concept, Need of Planning, Basic Activities included, Statements and Meaning of each principle) 2.5 Modelling Practices • Concept of Software Modelling • Analysis Modelling (Concept, Name of the analysis domains represented, Analysis Modelling Principles - Statements & Meaning of each principle • Design Modelling (Concept, Name of the three design aspects, Design Modelling Principles - Statements & Meaning of each principle) 2.6 Construction Practices • Concept of Software Construction • Coding (Concept, Preparation Principles, Coding Principles, Validation Principles) • Testing (Concept, Testing Principles) 2.7 Software Deployment • Concept of Delivery Cycle, Support Cycle & feedback Cycle • Deployment Principles- statements & meaning of each principles 2.8 Requirements Engineering • Concept of Requirements Engineering • Requirement Engineering Tasks (Concept and sub-tasks included) 2.9 SRS (Software Requirements Specifications) • Concept of SRS • General Format of SRS • Need/Importance of SRS	06	16
03	**Analysis And Design Modelling** **Objectives:-** ➢ To understand to build Analysis Model for a Software. ➢ To understand to apply design concepts and to build design	12	18

	elements 3.1 Analysis Modelling • Concept and need of Analysis Modelling • Objectives of Analysis Modelling 3.2 Analysis Modelling approaches • Structured Analysis (Concept) • Object Oriented Analysis (Concept) 3.3 Domain Analysis • Concept of Technical Domain of the software (to be discussed with examples) • Concept of Application Domain of the Software (to be disscussed with the examples: Finance & Banking, Hospitability, Health care, Embeded Software, Inventory System, etc.) • Goals • Inputs and Output of Domain analysis 3.4 Building the Analysis Model • Data Modelling Concepts (Meaning of the Terms- Data Objects, Data Relationships, Data Attributes, Cardinality & Modality with Examples) • Flow- Oriented Modelling - DFD (Use, Standard Notations, Rules to be followed, DFD Construction – Using any case Study) - Data Dictionary(Concept, Use, contents to be incoporated, Advantages) - Creating a Control Flow Model (Nature of software applications where it is required and used, Guidelines used for creating the model) - Creating Control Specifications (CSPEC) - Creating Process Specifications (PSPEC) • Scenario- Based Modelling - Developing Use Cases - What is a Use Case? - Purpose of a Use Case - Use Case Diagram • Creating a behavioural model - Concept - General Steps involved 3.5 Design Modelling • Design Process - Concept of Software Design - Design Quality Guidelines • Design Concepts • Meaning and importance of the following eight concepts w.r.t. ease of design, development, testing and debugging- i) Abstration ii) Architecture iii) Patterns iv) Modularity v) Information Hiding vi) Functional Independence vii) Refinement viii)Refactoring 3.6 The Design model • Data Design Elements • Architectural- Design elements		

	• Interface Design Elements • Component-Level design elements • Deployment-Level Design Elements		

04	**Software Testing Strategies And Methods**
	Objectives:-
	➢ To become familiar with concepts and strategies of Testing and Debugging.
	4.1 Software Testing Fundamentals
	• Definition of Software Testing
	• Concept of - Good Test, Successful Test, Testing strategies, Test Plan, Test Cases, Test Data.
	4.2 Characterstics of Testing Strategies
	4.3 Software Verification and Validation (V&V) - Concept and difference between these two.
	4.4 Testing Strategies
	• Unit Testing
	• Integration Testing
	  • Top-Down Approach
	  • Bottom-up Approach
	  • Regression Testing
	  • Smoke Testing
	4.5 Alpha and Beta Testing (Concept and differences)
	4.6 System Testing
	• Concept of System Testing
	• Types (Recovery, Security, Stress, Performance Testing) with examples
	4.7 Concept of White-box and Black-Box Testing
	4.8 Debugging
	• Concept and need of Debugging
	• Characterstics of bugs
	4.9 Debugging Strategies
	• Concept of Brute Force, Back Tracking, Induction, Deduction
		08	16

05	**Software Project Management** **Objectives:-** ➢ To understand the importance of Project Scheduling. ➢ To become familiar with Project Scheduling Techniques. ➢ To understand the concept of software risks and Risk Managemant. ➢ To understand the importance of Software Configuration Management. 5.1 Introduction to Software Project Management and its need. 5.2 The Management Spectrum – 4 Ps and their Significance 5.3 Project Scheduling • Concept of Project Scheduling • Factors that delay Project Schedule • Principles of Project Scheduling • Project Scheduling Techniques- Concept of Gantt Chart, PERT, CPM 5.4 Concept of Task Network 5.5 Ways of Project Tracking 5.6 Risk Management • What is Software Risk? • Concept of Proactive and Reactive risk strategies • Types of Software Risks 5.7 Risk Assessment • Risk Identification • Risk Analysis • Risk Prioritization 5.8 Risk control- Need, RMMM strategy 5.9 Software Configuration Management (SCM) • Need of SCM • Benefits of SCM • SCM Repository-Functions and Features supported • SCM Process- Change control and version Control	08	18
06	**Software Quality Management** **Objectives:-** ➢ To develop quality awareness for software products. ➢ To become familiar with the available Quality Standards. 6.1 Basic Quality Concepts 6.2 Software Quality Assurance (SQA) • Definition of SQA • SQA Activities 6.3 Concept of Statistical SQA 6.4 Quality Evaluation Standards • Six sigma for software - Concept of DMAIC and DMDAV Approach • ISO 9000 for software - concept and major considerations 6.5 CMMI- CMMI Levels, Process Areas considered. 6.6 CMMI Vs ISO. 6.7 McCall's Quality factors.	06	12
	Total	**48**	**100**

Learning Resources:
1) Books:

Sr. No.	Title	Author	Publisher
1	Software Engineering- A Practitioner's Approach	Roger S. Pressman	TATA McGraw-Hill
2	Software Engineering-Principals and Practices	Rohit Khurana	Vikas Publishing House
3	Software Engineering	Pankaj Jalote	Wiley India
4	Software Engineering	S. A. Kelkar	PHI Learning

Websites:-

www.sei.emu.edu
www.ieee.org
www.rational.com/UML
www.iso9001compliance.com
www.wileyindia.com