



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Information & Communication Technology

Subject Code: DI05032011

Subject Name : Software Engineering

w. e. f. Academic Year:	2026-27
Semester:	5 th
Category of the Course:	PCC

Prerequisite:	Basic programming, problem solving, Database Management
Rationale:	Software Engineering provides framework for development of quality software product. Software Engineering is essential for developing reliable, efficient, and maintainable software systems. This course enables students to understand software development life cycle (SDLC), design methodologies, testing techniques, and project management skills required in industry.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand characteristics for software engineering.	R,U
02	Understand and select suitable software development process models.	U,A
03	Apply requirement analysis techniques, Prepare SRS as well as construct DFD and object-oriented UML diagrams.	U,A
04	Analyze project management concepts and apply different planning and cost estimation techniques for a software product.	U,A
05	Prepare test-cases to test software functionalities.	R,U,A

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	1. Introduction to Software Engineering: 1.1 Software, Software Application Domain 1.2 Software Engineering – A layered Approach 1.3 Programs vs. Software Products 1.4 Software process and software engineering methods 1.5 Generic Framework Activity & Umbrella activity.	4	10
2.	2. Software development life cycle: 2.1 Introduction to software development life cycle (SDLC) 2.2 Software Development Models i. Waterfall Model ii. Incremental Process Model iii. Prototype Model iv. Spiral Model vi. Agile Development Model 2.3 Agile Development Model i. Agility Principles ii. Types of Agile Models (Extreme Programming (XP), Scrum)	7	15
3.	3. Requirement Engineering and Software Design: 3.1 Requirement Gathering and Analysis i. Software Engineering core principles: Communication, Planning, Modelling, Construction, Software deployment (Statement and meaning of each principle for each practice). ii. Requirement Engineering: Requirement Gathering and Analysis. 3.2 Software Requirement Specification (SRS) i. Functional Requirement ii. Non-Functional Requirement 3.3 Software Design i. Characteristics of good software design ii. Analysis v/s design 3.4 Classification of cohesion 3.5 Classification of coupling 3.6 Data Flow Diagram (DFD) i. Context Diagram ii. Level 1 DFD 3.7 Object Modeling with UML i. Use case Diagram ii. Class Diagram iii. Sequence Diagram iv. Activity Diagram	14	30



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4.	4. Software Project Management: 4.1 The Management Spectrum – 4P's. i. Responsibility of software project Manager 4.2 Metrics for Size Estimation: i. Line of Code (LoC) ii. Function Points (FP). 4.3 Project Cost Estimation Approaches: i. Overview of Heuristic, Analytical, and Empirical Estimation. ii. COCOMO (Constructive Cost Model) 4.4 Project Scheduling i. Gantt Chart ii. Sprint burn down chart for agile model 4.5 Risk Management i. Risk Identification ii. Risk Assessment iii. Risk Control	11	25
5.	5. Software Coding, Testing & Quality Assurance: 5.1 Code review i. Code Work through ii. Code Inspection 5.2 Software Documentation i. Internal Documentation ii. External Documentation 5.3 Unit Testing 5.4 Black box Testing 5.5 White box testing 5.6 Test case templates	9	20
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
20	50	30	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Software Engineering: A Practitioner's Approach, Roger S. Pressman, Tata McGraw Hill, 2010, ISBN :978-007-126782-3



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2. Fundamentals of Software Engineering, Rajib Mall, PHI, 2018, ISBN:978-93-88028-02-8
3. Object Oriented Modeling and design with UML, Michael R Blaha and James R Rumbaugh, Pearson Prentice Hall, 2009 ISBN:978-81-317-1106-4
4. Software Engineering: Principles and practices, Deepak Jain, Oxford University Press, New Delhi ISBN 9780195694840

(b) Open-source software and website:

1. <https://www.javatpoint.com/>
2. <https://www.geeksforgeeks.org/>
3. <https://www.tutorialspoint.com/>
4. www.w3schools.com
5. <https://www.techtarget.com/searchsoftwarequality/definition/agile-software-development>
6. <https://app.diagrams.net/> (Software Design -DFDs, Class Diagrams, Use Case Diagram)
7. <https://www.youtube.com/watch?v=WjwEh15M5Rw> (Agile Methodology)
8. <https://online.visual-paradigm.com/> (Software Design -DFDs, Class Diagrams, Use Case Diagram)

Suggested Course Practical List: If any

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Discuss generic framework activity and Umbrella activity	I	02
2	Identify problem statement to define the project with bounded scope of the project.	II	01
3	Select relevant process model to define activities and related tasks set for assigned project	II	01
4	Gather application specific requirements for assigned project - Requirement gathering	III	02
5	Prepare software requirement specification (SRS) for the above selected project	III	03
6	Develop data designs using data flow diagram (DFDs) and E-R (entity-relationship) diagram.	III	05
7	Prepare use-cases and draw use case diagram	III	02
8	Develop a class diagram for selected project	III	02
9	Develop Sequence diagram for selected project	III	02
10	Develop the activity diagram to represent flow from one activity to another for software development.	III	02
11	Evaluate size of the project using Function point metric for the assigned project.	IV	02
12	Estimate cost of the project using COCOMO (Constructive Cost Model) / COCOMO II approach for the assigned project.	IV	02
13	Track progress of the project using Timeline charts/ Gantt charts.	IV	02
14	Prepare various test case for selected project.	V	02



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	Total		30
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List of Laboratory/Learning Resources Required:

S. No.	Equipment Name with Broad Specifications	PrO. No.
1	Computer with latest configuration of windows or UNIX OS	All
2	Software tool: Any UML tool	All

Suggested Project List:

A suggestive list of micro-projects is given here. This should relate highly with competency of the course and the COs. Similar microprojects may be added by the course teacher concerned. Students shall be assigned two case studies throughout the term, and the faculty shall arrange three presentations prior to term work submission.

- Case study on attendance management system
- Case study on vehicle rental system
- Case study on hospital appointment booking
- Case study on gym management system
- Case study on Tours and Travel Management
- Case study on hostel management system
- Case study on student management system
- Case study on library management system
- Case study on hospital management system
- Case study on banking system
- Case study on collage management system
- Case study on movie ticket booking system
- Case study on online food ordering application
- Case study on online shopping
- Case study on hotel management system
- Case study on bus ticket reservation system
- Case study on railway ticket reservation system
- Case study on flight ticket reservation system

Suggested Activities for Students:

- Undertake micro-projects in teams.
- Prepare charts for various models, SDLC life cycles, UML notations etc.
- Prepare SRS documents based on case study.
- Discuss various case studies available on internet.
- An hour of problem solving for various case study topics may be organized and students are encouraged to participate.



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- f) Students are encouraged to register in various MOOCs such as: Swayam, Coursera, Udeemy etc.to further enhance their learning.
- g) Encourage students to interact with the industry person to discuss and gather information of current trends, models, documentation, testing methods and different tools used in industry.

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