

**GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**

**COURSE CURRICULUM**

**COURSE TITLE: FUNDAMENTALS OF SOFTWARE DEVELOPMENT**  
(Code: 3341603)

Diploma Programmes in which this course is offered	Semester in which offered
Information Technology, Computer Engineering	4 <sup>th</sup> Semester

### 1. RATIONALE

Software is the single most important technology on the world stage. Software's are used by almost all peoples for various purposes such as withdrawing payments from ATM machines, paying bills of electricity, telephone using ECS systems. Airline, railway tickets reservation online etc. People can work with computers flawlessly over a long period of time. One can also easily modify, upgrade the software without any problem or error. This course helps the students to develop, design, analyze, test & implement the software project during the courses in higher semesters of diploma programme.

### 2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- Identify and analyze problems in the field of S/W development

### 3. COURSE OUTCOMES:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Explain Software and Software Engineering
- Distinguish various Software Process Models (Approach of Software Development).
- Analyze gather and prepare Software Requirement Specification for given project.
- Draw use case diagrams for given modules and design user interface
- Apply code standard and Identify Software Testing Techniques.

### 4. Teaching and Examination Scheme

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
3	0	2	5	70	30	20	30	

**Legends:** L-Lecture; T – Tutorial/Teacher Guided Theory Practice; P - Practical; C – Credit ESE - End Semester Examination; PA - Progressive Assessment.

## 5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
<b>Unit-I</b> <b>Software Development Process</b>	1a Explain Software and Software Engineering.	1.1 Software <ul style="list-style-type: none"> <li>• Definition</li> <li>• Characteristics</li> </ul> 1.2 Software Myths 1.3 Software Engineering – <ul style="list-style-type: none"> <li>• A layered Technology approach</li> <li>• Definition</li> <li>• Need</li> </ul> 1.4 Software development 1.5 Generic Framework activities, Umbrella activities
	1b Compare various project process models and use in project planning.	1.6 Software Development Models <ul style="list-style-type: none"> <li>• Waterfall Model</li> <li>• Incremental Model</li> <li>• RAD Model</li> <li>• Prototyping Model</li> <li>• Spiral Model</li> </ul>
<b>Unit-II</b> <b>Software Analysis and Design</b>	2a Identify software requirement	2.1 Requirement Gathering and Analysis 2.2 Software Requirement Specification(SRS) <ul style="list-style-type: none"> <li>• Characteristic</li> <li>• Customer requirement</li> <li>• Functional Requirement</li> </ul>
	2b Analyze and design requirement	2.3 Design Process <ul style="list-style-type: none"> <li>• Classification of Design Activities</li> <li>• Classification of Design Methodology</li> </ul> 2.4 Cohesion and Coupling 2.5 Data Modeling Concepts <ul style="list-style-type: none"> <li>• Data Objects</li> <li>• Data Attributes</li> <li>• Relationships</li> <li>• Cardinality and Modality</li> </ul> 2.6 Data-Flow Diagrams <ul style="list-style-type: none"> <li>• Primitive Symbols of DFD</li> <li>• Develop DFD Model of System</li> <li>• Shortcoming of DFD Model</li> </ul>
	2c Develop Activity and use-case diagram	2.7 Scenario-Based Modeling <ul style="list-style-type: none"> <li>• Writing Use-Cases</li> <li>• Developing an Activity Diagram</li> </ul> 2.8 Architectural design decisions <ul style="list-style-type: none"> <li>• Architectural views</li> </ul>

		<ul style="list-style-type: none"> <li>• Architectural patterns</li> <li>• Application architectures</li> </ul>
<b>Unit-III</b> <b>Software Project Management</b>	3a Prepare and manage Schedule for different software development activities	<p>3.1 Responsibility of software project Manager</p> <ul style="list-style-type: none"> <li>• Job responsibility</li> <li>• Required skill to manage software project</li> </ul> <p>3.2 Metrics for Size Estimation</p> <ul style="list-style-type: none"> <li>• Line of Code</li> <li>• Function Points</li> </ul> <p>3.3 Project Estimation Technique</p> <ul style="list-style-type: none"> <li>• Empirical Estimation Technique</li> <li>• Heuristic Technique</li> <li>• Analytical Estimation Technique</li> </ul> <p>3.4 Scheduling</p> <ul style="list-style-type: none"> <li>• Work breakdown structure</li> <li>• Activity network and critical path Method</li> <li>• Gantt Chart</li> <li>• Project Monitoring and control</li> </ul> <p>3.5 Risk Management</p> <ul style="list-style-type: none"> <li>• Risk Identification</li> <li>• Risk Assessment</li> <li>• Risk Containment</li> </ul>
<b>Unit-IV</b> <b>Software Coding and testing</b>	4a Prepare software Documentation	<p>4.1 Code review</p> <ul style="list-style-type: none"> <li>• Code Work through</li> <li>• Code Inspection</li> </ul> <p>4.2 Software Documentation</p> <ul style="list-style-type: none"> <li>• Internal Documentation</li> <li>• External Documentation</li> </ul>
	4b Prepare test cases and test the software	<p>4.3 Testing</p> <ul style="list-style-type: none"> <li>• Unit Testing</li> <li>• Black-box Testing</li> <li>• White-box testing</li> </ul> <p>4.4 Test Documentation</p>

## 6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Software Development Process	10	10	08	00	18
II	Software Analysis and Design	14	04	08	10	22
III	Software Project Management	10	04	08	06	18
IV	Software Coding and testing	08	02	02	08	12

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
	<b>Total</b>	<b>42</b>	<b>20</b>	<b>26</b>	<b>24</b>	<b>70</b>

**Legends:** R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

## 7. SUGGESTED LIST OF EXERCISES/PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

*Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.*

S. No.	Unit No.	Practical Exercises (Outcomes' in Psychomotor Domain)	Hrs. required
1	I	Identify the development model for software with proper explanation	02
2	II	Gather requirement for software.	04
3	II	Prepare SRS Document for Software	04
4	II	Design Activity Diagram for system	02
5	II	Design Use-case Diagram for system	02
6	II	Design Data Dictionary of system	04
7	II	Prepare E-R Diagram of System	02
8	II	Design Data Flow Diagram of system	04
9	III	Prepare Gantt chart of system	02
10	IV	Prepare suitable test case for system testing.	02
<b>Total</b>			<b>28</b>

## 8. SUGGESTED LIST OF STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- i. Prepare charts for various models, SDLC life cycles, UML notations etc.
- ii. Prepare SRS documents based on case study.
- iii. Discuss various case studies available on internet.

**9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)**

Application for practical will be assigned to the students by the subject faculty and students will work in a group of 3 – 5

**10. SUGGESTED LEARNING RESOURCES****A) List of Books**

S. No.	Title of Book	Author	Publication
1.	Software Engineering: A Practitioner's Approach	Roger S. Pressman	Tata McGraw Hill,
2.	Software Engineering	Ian Somerville	Pearson education PHI
3.	Fundamentals of Software Engineering	Rajib Mall	PHI
4.	Structured System analysis and Design	Madhulika JAin	Bph Publication
5.	Object Oriented Modeling and design with UML, second edition	Michael R Blaha and James R Rambaugh	Pearson Prentice Hall

**B) List of Major Equipment/ Instrument with Broad Specifications**

Sufficient number of PCs are required according to number of students in the class for practicing development and maintenance of different software.

**C) List of Software/Learning Websites**

- i. <http://nptel.iitm.ac.in/>
- ii. <http://www.mhhe.com/engcs/compsci/pressman/student/olc/cases.mhtml>
- iii. [http://forum.jntuworld.com/showthread.php?3841-SOFTWARE-ENGINEERING-\(SE\)-Notes- All-8-Units](http://forum.jntuworld.com/showthread.php?3841-SOFTWARE-ENGINEERING-(SE)-Notes-All-8-Units)
- iv. Ppts: [www.facweb.iitkgp.ernet.in/~spp/LECT1.ppt](http://www.facweb.iitkgp.ernet.in/~spp/LECT1.ppt)
- v. Ppts: <http://www.phindia.com/rajibmall/chapters/>

**11. COURSE CURRICULUM DEVELOPMENT COMMITTEE****Faculty Members from Polytechnics**

- **Prof. Sunil K. Paryani**, Lecturer IT, Govt. Polytechnic, Ahmadabad
- **Prof. Bhadresh G. Prajapati**, Lecturer IT, Govt. Polytechnic, Himatnagar

**Coordinator and Faculty Members from NITTTR Bhopal**

- **Dr. Shailendra Singh**, HOD, Department of Computer Engineering and Application
- **Dr.K.J.Mathai**, Associate Professor, Department of Computer Engineering and Application