



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Computer Engineering / Computer Science & Engineering

Subject Code: DI05000111

Subject Name: Software Testing

w. e. f. Academic Year:	2026-27
Semester:	5th
Category of the Course:	PEC-03

Prerequisite:	Students should have basic knowledge of: • Programming language (Java, C, Python), Web Applications terminologies. • Database Simple SQL queries.
Rationale:	Software testing is an indispensable process in the software development life cycle, serving as a critical quality assurance measure. Its primary objective is to identify and rectify defects, ensuring that the software meets specified requirements and functions as intended. Through a systematic and rigorous examination of the software, testing helps detect errors, inconsistencies, and potential vulnerabilities, thereby enhancing the reliability and robustness of the final product. By validating each component and feature, software testing contributes to the overall improvement of software quality, fosters user satisfaction, and reduces the likelihood of post-deployment issues. Additionally, it provides stakeholders with confidence in the software's performance, functionality, and security, ultimately supporting the delivery of a high-quality and dependable product.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Describe the importance of Software Testing to enhance the quality of software products.	Understand
02	Apply black-box and white-box testing techniques effectively.	Apply
03	Develop effective test cases based on specifications, utilizing appropriate templates and methodologies.	Apply
04	Apply bug identification skills to create a comprehensive defect report for the software application.	Apply
05	Utilize popular testing tools (e.g., Selenium, JUnit, TestNG) for creating and executing automated test scripts.	Apply

**Revised Bloom's Taxonomy (RBT)*



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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

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction to Software Testing 1.1 Software testing and its importance 1.2 Software Testing Terminologies. 1.3 Verification and Validation (V Model), Quality Assurance, Quality Control. 1.4 Software development life cycle (SDLC) and testing phases 1.5 STLC – Software Testing Life Cycle in detail, SDLC vs STLC 1.6 Types of testing (manual vs. automated) 1.7 Testing principles, processes, and methodologies.	06	15
2.	Software Testing Techniques and Levels 2.1 Introduction of Black-box testing and white-box testing 2.2 Black Box Testing: Equivalence partitioning, boundary value analysis, and decision table testing 2.3 White box testing: Statement Coverage, Branch Coverage, Test of Conditions, Path Coverage 2.4 Unit testing, integration testing, system testing, acceptance testing	12	25



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	2.5 Static Testing, Dynamic Testing, Smoke Testing, Sanity Testing, Regression testing, Static vs. dynamic testing, Smoke Vs Sanity Testing 2.6 Various Types of Non-Function Testing		
3.	Software Testing Management 3.1 Test Planning: Preparing a Test Plan, Deciding Test Approach, Setting Up Criteria for Testing, Identifying Responsibilities, Staffing, Resource Requirements, Test Deliverables, Testing Tasks. 3.2 Test cases: Designing Test Cases, Developing Test Cases, Writing Test Cases, Test Case Templates, Types of Test Cases, Test Case Specification. 3.3 Test Reporting: Executing Test Cases, Preparing Test Summary Report, Test Data 3.4 Test Scenarios, Difference between Test Scenarios and Test Cases. 3.5 Requirements Traceability Matrix (RTM), Metrics and measurements in software testing.	09	20
4.	Defect Management 4.1 Defect Classification, Defect Prioritization and Severity 4.2 Defect Management Process 4.3 Defect Life Cycle Workflow and Stages, Defect Template 4.4 Roles and responsibilities of participants of Defect Triage Process, Step in Defect Triage Process, Activities performed during Defect Triage Process, Defect Resolution Process 4.5 Defect Prevention Process, Estimate Expected Impact of Defect, Techniques for Finding Defects, Reporting a Defect.	09	20
5.	Testing Automation Tools 5.1 Introduction to test automation. Need of automation in Software Testing. Automation Testing Life Cycle 5.2 Manual Testing vs Automation Testing. Benefits and challenges of test automation	09	20



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	5.3 Selenium: Introduction to Selenium framework, Selenium WebDriver, browser automation, and advantages of Selenium for web application testing. 5.4 JUnit: Basic concept of a Junit testing framework for Java applications, annotations, assertions, and execution of test cases. 5.5 TestNG: Basic concept of the TestNG for Java applications, advantages of TestNG, annotations, assertions, execution of test cases, Data-Driven Testing, Integration with Selenium. 5.6 Creating and executing automated test scripts.		
	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
14	26	30	0	0	0

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 Testing: Principles, Techniques and Tools, S Limaye, M. G. McGraw-Hill Education; 1st edition, ISBN-109197717709979 :
2. Software Testing Principles and Practice, Srinivasan Desikan, Pearson Education, ISBN-10: 9788177581218
3. Software Testing Concepts and Tools, Nageshwara Rao Pusuluri, DreamTech, ISBN 10: 8177227122.
4. Software Testing Principles and Practice, Srinivasan Desikan, Pearson Education, ISBN-10 9199711797879



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(b) Open-source software and website:

1. https://onlinecourses.nptel.ac.in/noc18_cs42/
2. <https://www.guru99.com/software-testing.html>
3. <http://www.softwaretestinghelp.com>
4. [Tools QA](#)
5. [Software Testing in Continuous Delivery | Atlassian](#)
6. [The Complete 2023 Software Testing Bootcamp | Udemy](#)
7. [Software Testing - Testing Tutorials, Testing Tools, Testing Software, Testing Jobs, Testing Techniques \(onestoptesting.com\)](#)

Suggested Course Practical List:

- 1) Create a glossary of at least five software testing terminologies with explanations.
- 2) Describe why both SDLC and STLC are essential in the software development process.
- 3) Enlist and present at least three popular testing methodologies (e.g., Agile, Waterfall) with its advantages and disadvantages.
- 4) Write a program and design test cases for the following Control and decision-making statement. 1) For... Loop 2) Switch...case 3) Do... While 4) If...else.
- 5) Design test cases for different tasks (OTP Verification, Image upload, Age verification in Registration) in any software modules using Equivalence partitioning, boundary value analysis, and decision table testing techniques of Black Box Testing.
- 6) Identify system specification & design test cases for Sales Invoice Management.
- 7) Design Test Cases for the Flight Ticket Booking system.
- 8) Develop test scenarios and test cases for the login functionality of a social media application.
- 9) Develop an RTM and measure testing metrics for any two dynamic web pages of an e-commerce website.



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- 10) Execute test cases for a travel booking app and prepare a test summary report.
- 11) Prepare a defect report after executing test cases for the registration page.
- 12) Prepare a defect report after executing test cases for withdrawal of amount from the ATM Machine.
- 13) Install and set up the Selenium WebDriver and necessary drivers (e.g., ChromeDriver, GeckoDriver) on your system. Install JUnit, TestNG using an IDE (Integrated Development Environment) like Eclipse or IntelliJ.
- 14) Design and run a test script for a registration page using the Selenium tool and JUnit.
- 15) Design and run a test script for a Login page and home page using the Selenium tool and TestNG.

List of Laboratory/Learning Resources Required:

- a) Computer system with operating system: Windows 7 or higher version, macOS, and Linux, with 4GB or higher RAM
- b) Microsoft Office or any Open-source spreadsheet package
- c) CODE Editor (Notepad++, VS Code, Sublime), JAVA IDE (Eclipse, NetBeans, IntelliJ)
- d) Testing frameworks (e.g. Selenium, JUnit, TestNG)

Suggested Project List:

1. User Authentication Testing for a Web Application

Test login, registration, and logout functionalities using valid and invalid inputs to ensure secure access control. Verify password policies, session management, and appropriate error messages for different user scenarios.

2. Data Validation Testing for a DBMS



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Validate database inputs for correctness, format, and constraints such as primary key, null values, and data types. Ensure invalid data is rejected while valid data is stored accurately in the database.

3. Integration Testing for a Payment Gateway

Test the interaction between the application and payment gateway for successful and failed transactions.

Verify transaction status updates, error handling, and secure data transmission.

4. Functional Testing of a Travel Booking Website

Validate key functionalities like search, booking, cancellation, and payment processing.

Ensure all features work according to the specified requirements.

5. Automated Testing for a Task Management Tool

Develop automated test scripts to verify task creation, update, and deletion operations.

Execute tests repeatedly to ensure reliability and reduce manual testing effort.

6. Accessibility Testing for a Healthcare Application

Evaluate application usability for users with disabilities using screen readers and keyboard navigation. Check color contrast, font readability, and compliance with accessibility standards.

7. GUI Testing for an Inventory Management System

Test graphical user interface elements such as buttons, forms, and menus for correct behavior.

Ensure consistency, alignment, and responsiveness across different devices and screens.

8. Usability Testing for a News Aggregation Website

Assess ease of navigation, readability, and accessibility of news content for users.

Gather user feedback to improve overall user experience and interface design.

9. Performance Testing for a Document Management System

Evaluate system performance under load by simulating multiple users accessing documents.



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Measure response time, throughput, and system stability under various conditions.

10. Integration Testing for a Chat Application

Verify integration between frontend, backend, and database for message exchange.

Ensure real-time communication and synchronization across multiple users.

11. Automated Testing for a Voting System

Create automated tests to validate vote casting, counting, and result generation processes.

Ensure prevention of duplicate voting and maintain accuracy and integrity of data.

Suggested Activities for Students:

In addition to classroom and laboratory sessions, students are encouraged to participate in the following **co-curricular and experiential learning activities**. These activities strengthen conceptual understanding, teamwork, and practical development.

Recommended Activities

- Develop a test plan for a given software project.
- Identify test objectives, scope, resources, and schedule
- Learn to log and manage defects using a bug tracking system.
- Perform exploratory testing on a given application without predefined test cases.
- Practice boundary value analysis and equivalence partitioning.
- Develop automated test scripts for a specific functionality using a chosen test automation tool.