



GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Master of Computer Applications, 2nd Semester

Subject Name: Software Testing

Subject Code: 629406

With effective
from academic
year 2020-21

1. Learning Objectives:

- To understand the importance of Software Testing for good Quality Software
- To understand Software Quality Assurance (SQA) architecture and its importance with the details of each component.
- To Design, Develop and write Test Plan & Test Cases
- To automate testing with Selenium Web driver

2. Prerequisites: Software Engineering Basics, Basics of Java Programming

3. Contents:

Unit	Chapter Details	Weightage Percentage
Unit I	Introduction to software Quality and Assurance The software quality challenge, Software quality, Software quality factors Management and its role in software quality assurance	10%
Unit II	Components of SQA The components of the software quality assurance system – overview Pre-project Software Quality Components Contract review, Development and quality plans	15%
Unit III	SQA Components in the Project Life Cycle and Strategies Integrating quality activities in the project life cycle, Reviews, Software testing – strategies, Black Box Testing and White Box Testing	25%
Unit IV	Software Testing –Implementation: The Testing Process, Test Case Design, Automated Testing, Testing Life Cycle, Software Quality Implementation, Assuring the quality of software maintenance components, Assuring the quality of external Participants' contributions, CASE tools and their effect on software Quality	25%
Unit V	Software Quality Infrastructure Components (Introduction only) Procedures and work instructions, Staff training and certification, Corrective and preventive actions, Documentation control	10%
Unit VI	Software Quality Metrics Software Quality metrics, Cost of Quality	15%
Unit VII (*)	Introduction to Selenium, Selenium WebDriver, Selenium WebDriver Architecture, Selenium Test Life Cycle	•

(*) – Only for practical.

4. Text Book:

Daniel Galin, “Software Quality Assurance”, Pearson Publication, 2009.



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5. Reference Books:

1. KshirsagarNaik and PriyadarshiTripathy, Software Testing & Quality Assurance- Theory and Practice, Wiley Studentedition
2. William E. Perry, Effective Methods for Software Testing, WILEY, 3rdEdition
3. Alan C. Gillies, "Software Quality: Theory and Management", International Thomson Computer Press,1997.
4. M G Limaye, Software Testing, Tata McGraw-Hill Education,2009

6. Chapter wise Coverage from Main Reference Book(s):

Unit No.	Text Books	Topics/Subtopics
I	Book-1	1.1 to 1.2, 2.1 to 2.6, 3.1 to 3.6, 26.1 to 26.4
II	Book-1	4.1 to 4.7,5.2 to 5.5, 6.1 to 6.4
III	Book-1	7.1 to 7.4, 8.1 to 8.5, 9.1 to 9.5,
IV	Book-1	10.1 to 10.4, 11.1 to 11.4, 12.2 to 12.3, 13.1 to 13.4
V	Book-1	14.1 to 14.4, 16.2 to 16.10,17.2 to 17.8, 19.1 to 19.6
VI	Book-1	21.1 to 21.6, 22.1 to 22.3

7. Accomplishments of the student after completing the course:

- Utilize the concepts in software development lifecycle.
- Demonstrate their capability to adopt quality standards.
- Assess the quality of software product.
- Apply the concepts in preparing the quality plan & documents.

Practical List

A. Setup: Using Java

- I. Download and install the Java Software Development Kit(JDK)
<http://www.oracle.com/technetwork/java/javase/downloads/index.html>
- II. Download "Eclipse IDE for Java Developers"
<http://www.eclipse.org/downloads/>
- III. Download the Selenium Java Client Driver
<http://seleniumhq.org/download/>
- IV. Configure Eclipse IDE with WebDriver

Using Python

- I. Download and install Python
- II. Download and install Selenium Webdriver
- III. Get Drivers for browser
- IV. Install Pycharm (or any Python IDE)
- V. Configure Pycharm IDE (or any Python IDE) with WebDriver



B. Suggested Applications for QA & QC:

1	Leave Management System with following modules: <ul style="list-style-type: none">a. Login – Two types of User: Admin and Userb. AdminFunctionalities:<ul style="list-style-type: none">i. Manage LeaveTypesii. Manage UserLeavesiii. Manage Usersiv. Manage DifferentShiftsv. Manage Reporting Groups and TeamStructurec. Time and Attendance<ul style="list-style-type: none">User can view his/her attendancedetailAdmin can view user's attendancelogAdmin can generate various report like LateIn, EarlyOut, etc.d. Leaves<ul style="list-style-type: none">User can apply leave and Admin can reject/approveUser can view his leave request log, can modify and cancel as well
2	Recruitment System <ul style="list-style-type: none">a. Manage Positions and vacancies within an organizationb. Manage Advertisement on the positionsc. Manage vacancy process from application to acceptance or rejectiond. Manage and Setup Interviewse. Maintain Database
3	Consider the below module which is responsible for Package purchase and Payment in different currencies: <ul style="list-style-type: none">• The User can purchase one out of three packages namely, Basic, Moderate, & Premium.• The User can purchase a particular package in three currencies.• The available currencies are Dollar, which is by default, Pound, & INR.• User can change the currency only on first step of 3, which is while selecting the package.a. The User Selects the Package.b. The User calculates the VAT amount applicable with respect to the country selection.c. The User pays online through debit/ credit card only.<ul style="list-style-type: none">• List out all the possible Test Cases for above module.• List out critical step, which if not properly handled can deviate the user from the system.• List out the enhancement point which can avail user more flexibility about one of the above three steps
4	In Airline reservation system, the following features need to be tested namely, <ul style="list-style-type: none">a. Loginb. Search and book flightsc. Search and book packagesd. RegisterFeature not in scope,e. Search and book hotels<ul style="list-style-type: none">• Pre-requisites: Database & Payment gateway's sanboxenviroment access should



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	<p>be available.</p> <ul style="list-style-type: none"> • Prepare the Test Plan for the above with all the possible criteria need To be considered. • Prepare the Test Cases for the features in scope to be tested. (At least one for each above mentioned feature) <p>Prepare the Defect Report.</p>
5	<p>Healthcare Web application with following modules:</p> <ol style="list-style-type: none"> a. Patient Registration b. Scheduling c. Treatment d. Billing
6	<p>Consider a School Management System, which allows Parent to download Children's Progress Report and Results from School's website So How can we authenticate the User (parent)? & it has dual Authentication system integrated on Login page.</p>
7	<p>Notepad "Save As" Functionality</p> <p>What are the different scenarios that can be identified for testing a simple notepad save as functionality? The Save as does navigate to the file name and file path. Given these two fields what are the various scenario that can be applied for testing?</p>

Part 1: Software Testing (Manual) - Mandatory

- A. Create Test cases (Unit, Integration, System and Acceptance Test Cases) for Application
- B. Perform manual testing using test case created and prepare test Metrics

Part 2: Suggested Template for Test case creation.

Sr#	Test condition / Steps	Input	Expected Result	Actual Result	Pass/Fail

Write test cases using following techniques (Suggested)

1. Line Coverage using Cyclomatic Complexity
 2. Boundary Value Analysis(BVA)
 3. Equivalence Partition(EP)
 4. State Transition Technique v) Error Guessing Technique
- Test Case Management Tools like JIRA (desirable)

Part 3: Software Testing (Automated) - Mandatory

Test automation – script creation and execution

Tools: Selenium

A. Concepts

1	Introduction to Selenium, Installation and Setup
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2	<p>Selenium WebDriver Commands</p> <ul style="list-style-type: none"> • BrowserCommands • NavigationCommands • WebElementCommands • FindElement and FindElementsCommand • CheckBox& Radio ButtonOperations • DropDown& Multiple SelectOperations • Handle Dynamic Web Tables in SeleniumWebdriver
3	<p>Navigate back/forwards, get, refresh</p> <ul style="list-style-type: none"> • I_ loading a page in current window / New window • Move back and forward • Refresh Page
4	<p>Interrogation: get windowtitle currenturl Pagesource</p>
5	<p>Locating web elements by Id, ClassName, LinkText, PartialLinkText, Name, TagName, CssSelector ,XPath</p>
6	<p>Inspecting elements in web browsers</p>
7	<p>Element interrogation</p>
8	<p>Manipulation: Click, submit, shift-click, special actions, type text, clear text, list box selection and manipulation commands</p>
9	<p>Synchronization: Page load time out, implicit wait, explicit wait,ExpectedConditions class</p>
10	<p>Window handling: size, position, handles, switch to</p>
11	<p>Screenshot/capture</p>
12	<p>Browser profile: set preferred language, changing user agent, enable extension</p>
13	<p>Cookies: reading, creating and deleting</p>
14	<p>Data Driven Testing; Use pre-stored data as input and expected output (possible data Source file Excel)</p>
15	<p>Page Object Model: test scenario like shopping cart from login</p>

B. Practical List

Write script and perform Following list of activities / test scenarios using offline and online web application (Permissible)

1	Open URL in different browsers (Chrome, Firefox, IE)
2	Perform mouse hovers and other events
3	To take snapshots.
4	Getting current time-stamp
5	To Handle a drop-down.
6	Handling 2 3 steps at a time like Website Registration+login+logout at a time in single run.



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7	To Upload File.
8	Storing and fetching data from excel (E.g. Registration data)
9	Radio button selection.
10	Checkbox Selection
11	Selection
12	Absolute/Relative XPath
13	Basic Selenium framework (Advance).
14	Generate Reports (Advance)
15	Logging (Advance).
16	Handling multiple browser tabs.
17	Handling multiple div./frames of page. (Advance)
18	Handling browser's parent and child window.(Advance)
19	verifies an expected page title, UI Element, Text and Table content
20	Handling mouse over menu/sub-menu.
21	To Provide meaningful messages in assertions!
22	Test Login of any web application
23	Test Shopping cart
24	Test using excel file data as input
25	Generate test report

References:

<https://www.softwaretestinghelp.com/selenium-webdriver-commands-selenium-tutorial-17/http://toolsqa.com/selenium-webdriver/>

Part4: Advanced Testing - (Desirable)

a. Perform Security Testing

1. Security testing for architecture, source code and user interface
2. Vulnerability testing with help of open source and licensed tools

References: www.owasp.org: OWASP guideline compliance verification

Type: Manual / Automated (using Tool) - (Desirable)

b. Perform Performance Testing

Performance testing for functionality for 50 concurrent users

Type: Manual / Automated (using Tool)

Part5: Issue Tracking(desirable)

Tools: JIRA, Bugzilla

Web References:

1. <http://www.opensourcetesting.org/>
2. <http://www.onestoptesting.com/>

Note: Some of the practical's form the above practical list may have seemingly similar definitions. For better learning and good practice, it is advised that students do maximum number of practical's. In the practical examination, the definition asked need not have the same wordings as given in the practical list. However, the definitions asked in the exams will be similar to the ones given in the practical list.