



GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Master of Computer Applications, 4th Semester

Subject Name: Software Quality Assurance (SQA)

Subject Code: 4649308

With effective
from academic
year 2018-19

1. Learning Objectives:

- To understand the basic view of software quality and quality factors.
- To understand the Software Quality Assurance (SQA) architecture and the details of its components.
- To understand of how the SQA components can be integrated into the project life cycle.
- To be familiar with the software quality infrastructure.

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	25%
Unit IV	Software Testing – Implementation: 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 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%

Desirable Topics:

1) Quality and Management Standards (ISO, CMMi, ISO/IEC, IEEE, EIA).

4. Text Book:

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

5. Reference Books:



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- 1) KshirsagarNaik and PriyadarshiTripathy, Software Testing & Quality Assurance-Theory and Practice, Wiley Student edition
- 2) William E. Perry, Effective Methods for Software Testing, WILLEY, . 3rd Edition
- 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 life cycle.
- 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:

1. Download and install the **Java Software Development Kit (JDK)**

<http://www.oracle.com/technetwork/java/javase/downloads/index.html>

2. Download "**Eclipse IDE for Java Developers**"

<http://www.eclipse.org/downloads/>

3. **Download the Selenium Java Client Driver**

<http://seleniumhq.org/download/>

4. **Configure Eclipse IDE with WebDriver**

B) Suggested Applications for QA & QC:

1	Leave Management System with following modules: a. Login – Two types of User: Admin and User b. Admin Functionalities: i. Manage Leave Types ii. Manage User Leaves iii. Manage Users iv. Manage Different Shifts v. Manage Reporting Groups and Team Structure c. Time and Attendance i. User can view his/her attendance detail ii. Admin can view user's attendance log iii. Admin can generate various report like LateIn, EarlyOut, etc.. d. Leaves i. User can apply leave and Admin can reject/approve ii. User can view his leave request log, can modify and cancel as well ** Many other functionalities can be added to make it more complex
2	Recruitment System a. Manage Positions and vacancies within an organization b. Manage Advertisement on the positions c. Manage vacancy process from application to acceptance or rejection d. Manage and Setup Interviews e. Maintain Database
3	Consider the below module which is responsible for Package purchase and Payment in different currencies: – 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.



	<p>c. The User pays online through debit/ credit card only.</p> <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	<p>In Airline reservation system, the following features need to be tested namely,</p> <ul style="list-style-type: none">a. Loginb. Search and book flightsc. Search and book packagesd. Register <p>Feature not in scope,</p> <ul style="list-style-type: none">e. Search and book hotels <ul style="list-style-type: none">– Pre-requisites: Database & Payment gateway's sanbox enviroment access should be available.– 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)– Prepare the Defect Report.
5	<p>Healthcare Web application with following modules:</p> <ul style="list-style-type: none">a. Patient Registrationb. Schedulingc. Treatmentd. 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: Test Planning (Desirable)

- a) Prepare Quality Plan for any Application like online shopping etc.
- b) Prepare Test Plan for any Application like Railway Reservation System etc.

Output: Test plan and Quality Plan

Part 2: 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



Suggested Template for Test case creation.

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

Write test cases using following techniques (Suggested)

- i) Coverage
 - ii) Boundary Value Analysis (BVA)
 - iii) Equivalence Partition (EP)
 - iv) State Transition Technique
 - v) Error Guessing Technique
- c) 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
2	Selenium WebDriver Commands <ul style="list-style-type: none"> • Browser Commands • Navigation Commands • WebElement Commands • FindElement and FindElements Command • CheckBox & Radio Button Operations • DropDown & Multiple Select Operations • Handle Dynamic WebTables in Selenium Webdriver
3	Navigate back/forwards, get, refresh 1. loading a page in current window / New window 2. Move back and forward 3. Refresh Page
4	Interrogation: i) get window title ii) current url iii) Page source
5	Locating web elements by Id, ClassName,LinkText,PartialLinkText,Name,TagName, CssSelector , XPath
6	Inspecting elements in web browsers
7	Element interrogation
8	Manipulation : Click, submit, shift-click, special actions, type text, clear text, list box selection and manipulation commands
9	Synchronization: Page load time out, implicit wait, explicit wait , ExpectedConditions class
10	Window handling: size, position, handles, switch to
11	Screenshot/capture



12	Browser profile: set preferred language, changing user agent, enable extension
13	Cookies: reading, creating and deleting
14	Data Driven Testing ; Use pre-stored data as input and expected output (possible data source file Excel)
15	Page Object Model : test scenario like shopping cart from login

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.
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/>

Part 4: 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) - (Desirable)

Part 5: Issue Tracking (desirable)

Tools: JIRA, BugZilla

Web References:

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

Note: Some of the practicals from the above practical list may have seemingly similar definitions. For better learning and good practice, it is advised that students do maximum number of practicals. 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.