



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Master of Business Administration**

**Level: PG**

**Branch: Information Technology**

**Course / Subject Code: MB03096031**

**Course / Subject Name : Fundamentals of Software Quality Assurance**

w. e. f. Academic Year:	2025-2026
Semester:	3
Category of the Course:	Major Subject 3

<b>Prerequisite:</b>	Any Graduate
<b>Rationale:</b>	This course provides students with a strong foundation in ensuring software quality through structured processes, effective testing strategies, and industry-standard practices. It aims to build competence in developing high-quality software products through verification, validation, and testing techniques.

### Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Understand and apply software quality principles and practices.	Understand
02	Identify software quality metrics and models.	Understand
03	Design and execute test cases for software applications.	Apply
04	Implement various types of software testing.	Apply
05	Understand the role of standards, tools, and documentation in SQA.	Understand

*\*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 / CA (M)	PA/CA (I)	ESE (V)	
3	1	0	4	70	30	50	0	150

### Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	<b>Introduction to Software Quality Assurance:</b> <ul style="list-style-type: none"> <li>• Historical Perspective of Quality</li> <li>• What is Quality? Fact vs Perception</li> </ul>	10	17



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	<ul style="list-style-type: none"> <li>• Definitions of Quality: Product, Manufacturing, Customer-Based</li> <li>• Core Components of Quality: Cost, Time, Features</li> <li>• Financial Aspect of Quality: Cost of Quality (Prevention, Appraisal, Failure)</li> <li>• Total Quality Management (TQM): Principles and Process</li> <li>• Quality Management through Statistical Process Control (SPC)</li> <li>• Quality Management Through Cultural Change</li> <li>• Benchmarking, Metrics, and Problem Solving Tools</li> <li>• Software Quality vs. Product Quality</li> <li>• Constraints in Software Quality</li> <li>• Characteristics of Software</li> <li>• Defects and Quality Management in Software Lifecycle</li> <li>• Pillars of Software Quality Systems</li> </ul>		
2.	<p><b>Fundamentals and Challenges in Software Testing:</b></p> <ul style="list-style-type: none"> <li>• Necessity and Objectives of Software Testing</li> <li>• Testing vs Debugging</li> <li>• Fundamentals of Testing Process</li> <li>• Historical Context and Definitions</li> <li>• Psychology and Principles of Testing</li> <li>• Requirement Traceability Matrix (RTM)</li> <li>• Testing Throughout the Development Life Cycle</li> <li>• Misconceptions in Testing</li> <li>• Software Test Policy, Test Strategy, Test Planning</li> <li>• Mutation Testing, Cost of Testing</li> <li>• People and Process Challenges in Testing</li> <li>• Categories of Defects: Error, Fault, Failure</li> <li>• Skills Required for Testers</li> <li>• Management Awareness and Testing Culture</li> </ul>	12	18
3.	<p><b>Test Design Techniques and Unit Testing:</b></p> <p><b>Boundary Value Testing (BVT):</b></p> <ul style="list-style-type: none"> <li>• Normal, Robust, Worst-Case, Special Values</li> </ul> <p><b>Equivalence Class Partitioning (ECP):</b></p> <ul style="list-style-type: none"> <li>• Traditional and Improved ECP, Edge Testing</li> </ul> <p><b>Decision Table-Based Testing:</b></p>	10	17



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	<ul style="list-style-type: none"> <li>• Decision Tables, Cause-and-Effect Graphing</li> </ul> <p><b>Path Testing:</b></p> <ul style="list-style-type: none"> <li>• Program Graphs, DD-Paths, Control Flow Graphs</li> <li>• Coverage Metrics, Basis Path Testing</li> </ul> <p><b>Data Flow Testing:</b></p> <ul style="list-style-type: none"> <li>• Define/Use Pairs, Program Slicing Tools</li> </ul> <p><b>Guidelines, Observations, and Random Testing Techniques</b></p>		
4.	<p><b>Software Verification, Validation, and V-Test Model:</b></p> <ul style="list-style-type: none"> <li>• Software Verification vs Validation</li> <li>• Verification Workbench and Methods</li> <li>• Types and Levels of Reviews (Code, Peer, Walkthroughs)</li> <li>• Validation Workbench: Strategies and Coverage</li> <li>• Acceptance Testing Management</li> <li>• V-Model for Software Development</li> <li>• Testing at Proposal, Requirement, Design, and Coding Stages</li> <li>• Roles and Responsibilities in V&amp;V</li> <li>• Integration of V&amp;V in SDLC</li> <li>• Understand the purpose and structure of the ISO 27000 series</li> <li>• Explain the importance of ISO/IEC 27001 and its role in ISMS</li> <li>• Understand how organizations benefit from ISO 27k implementation</li> </ul>	13	18
5.	<p><b>Practical:</b></p> <ul style="list-style-type: none"> <li>• Make a Test Plan – For login or calculator app.</li> <li>• Write 10+ Test Cases for login form.</li> <li>• Do Functional Testing – On any small web app.</li> <li>• Write Bug Report – Include steps, severity.</li> <li>• Use BVA &amp; EP – On age input (e.g., 18–60).</li> </ul>	15	30(CEC)
<b>Total</b>		<b>60</b>	<b>100</b>

**Suggested Specification Table with Marks (Theory):**

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
10%	20%	25%	20%	15%	10%

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



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## References/Suggested Learning Resources:

### (a) Books:

Sr. No.	Title	Author(s)	Publisher	Edition	Year
1	Software Testing and Continuous Quality Improvement	William E. Lewis	CRC Press	Third	2016
2	Software Testing: Principles, Techniques and Tools	M. G. Limaye	TMH		2017
3	Foundations of Software Testing	Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black	Cengage Learning	3rd	
4	Software Testing: A Craftsman's Approach	Paul C. Jorgenson	CRC Press	4th	2017

### (b) Open source software and website:

1. <https://www.selenium.dev/>
2. <https://junit.org/>
3. <http://appium.io/>
4. <https://testng.org/>
5. <https://cucumber.io/>
6. <https://jmeter.apache.org/>
7. <https://www.postman.com/>

### CO- PO Mapping:

Semester 3	Course Name : Fundamentals of Software Quality Assurance				
	POs				
Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	3	-	2	-
CO2	2	3	-	-	-
CO3	2	3	-	-	2
CO4	2	3	-	-	3
CO5	3	2	-	3	-

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

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