

AC– 11-03-2025
Item No. –05

Approved by the BoS in Information Technology on 05-03-2025 Item No. 05

As Per NEP 2020

Tolani College of Commerce (Autonomous)



Knowledge is Supreme

Title of the Course: Software Quality Assurance

**Programme: B.Sc.(Information Technology)
Semester VI**

**Syllabus for 4 credits
From the academic year-2025-2026**

Sr. No.	Heading	Particulars
1	Description the course :	Quality Assurance (QA) in software testing is a crucial process that ensures software products meet the highest quality requirements, ensuring flawless performance and customer satisfaction.
2	Vertical:	Major
3	Type:	Theory and Project
4	Credit:	4 credits
5	Hours Allotted:	60 Hours
6	Marks Allotted:	Total 100 Marks Practical Evaluation:40 Marks Semester-End: 60 Marks
7	Course Objectives:	<ol style="list-style-type: none"> 1. To understand and be able to apply software quality fundamentals to real-world software projects, including an ethical approach to Quality, value and cost considerations, quality models and safety considerations. 2. To demonstrate by means of example – software quality management processes such as quality assurance, verification and validation, and reviews/audits. 3. To illustrate the essential software practical considerations such as quality requirements, defect characterization, SQM techniques and software quality measurement. 4. To Employ the latest software quality tools.
8	Course Outcomes:	<ol style="list-style-type: none"> 1. The learners will be familiar with the process of verification and validation. 2. The learners will understand the process of applying tests to software and the fundamental components of a test case. 3. The learners will be able to derive test cases from software requirement specifications - including being able to partition input and output domains, form test specifications, and identify valid combinations of input. 4. The learners will understand and be able to distinguish between methods of judging test case adequacy and how to design tests that will accomplish the obligations of methods.

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Modules:-

Module 1: Introduction to Quality, Software Quality

(15 Hours)

- Historical Perspective of Quality, What is Quality? (Is it a fact or perception?), Definitions of Quality, Core Components of Quality, Quality View, Financial Aspect of Quality, Customers, Suppliers and Processes, Total Quality Management (TQM), Quality Principles of Total Quality Management, Quality Management Through Statistical Process Control, Quality Management Through Cultural Changes, Continual (Continuous) Improvement Cycle, Quality in Different Areas, Benchmarking and Metrics, Problem Solving Techniques, Problem Solving Software Tools.
- Introduction, Constraints of Software Product Quality Assessment, Customer is a King, Quality and Productivity Relationship, Requirements of a Product, Organization Culture, Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality, Quality Management System Structure, Pillars of Quality Management System, Important Aspects of Quality Management.

Module 2: Fundamentals of testing

(15 Hours)

- Introduction, Necessity of testing, What is testing? Fundamental test process, The psychology of testing, Historical Perspective of Testing, Definitions of Testing, Approaches to Testing, Testing During Development Life Cycle, Requirement Traceability Matrix, Essentials of Software Testing, Workbench, Important Features of Testing Process, Misconceptions About Testing, Principles of Software Testing, Salient Features of Good Testing, Test Policy, Test Strategy or Test Approach, Test Planning, Testing Process and Number of Defects Found in Testing, Test Team Efficiency, Mutation Testing, Challenges in Testing, Test Team Approach, Process Problems Faced by Testing, Cost Aspect of Testing, Establishing Testing Policy, GUI testing, Compatibility Testing, Security Testing, Performance Testing, Volume Testing, Stress Testing, Recovery Testing, Installation Testing, Requirement Testing, Regression Testing, Error Handling Testing, Manual Support Testing, Intersystem Testing, Control Testing, Smoke Testing, Adhoc Testing, Object Oriented Application Testing, Testing of Internal Controls, COTS Testing, Client Server Testing, Web Application Testing, Mobile Application Testing, e- Business e-Commerce Testing, Agile Development Testing, Data Warehousing Testing
- Introduction, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big-Bang Testing, Sandwich Testing, Critical Path First, Sub System Testing, System Testing, Testing Stages.
- Raising Management Awareness for Testing, Skills Required by Tester, Testing throughout the software life cycle, Software development models, Test levels, Test types, the targets of testing, Maintenance Testing.

Module 3: Unit Testing**(15 Hours)**

- **Boundary Value Testing:** Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing, Guidelines for Boundary Value Testing,
- **Equivalence Class Testing:** Equivalence Classes, Traditional Equivalence Class Testing, Improved Equivalence Class Testing, Edge Testing, Guidelines and Observations.
- **Decision Table–Based Testing:** Decision Tables, Decision Table Techniques, Cause-and- Effect Graphing, Guidelines and Observations,
- **Path Testing:** Program Graphs, DD-Paths, Test Coverage Metrics, Basis Path Testing, Guidelines and Observations,
- **Data Flow Testing:** Define/Use Testing, Slice-Based Testing, Program Slicing Tools

Module 4: Software Verification and Validation, V-test Model**(15 Hours)**

- Introduction, Verification, Verification Workbench, Methods of Verification, Types of reviews on the basis of Stage Phase, Entities involved in verification, Reviews in testing lifecycle, Coverage in Verification, Concerns of Verification, Validation, Validation Workbench, Levels of Validation, Coverage in Validation, Acceptance Testing, Management of Verification and Validation, Software development verification and validation activities.
- Introduction, V-model for software, testing during Proposal stage, Testing during requirement stage, Testing during test planning phase, Testing during design phase, Testing during coding, VV Model, Critical Roles and Responsibilities.

10 Reference Books:
Author: William E. Lewis, **Title:** Software Testing and Continuous Quality Improvement
Publisher: CRC Press 3rd Edition **year:**2016
Author: M. G. Limaye, **Title:** Software Testing: Principles, Techniques and Tools
Publisher: TMH **year:**2017
Author: Paul C. Jorgenson, **Title:** Software Testing: A Craftsman’s Approach,
Publisher: CRC Press 4th Edition **year:**2017

11 Project Assessment:40% **Sem ter End Examination:60%**

12 Continuous Evaluation through: **Project**

13 Format of Question Paper:

Scheme of Evaluation Pattern
Table 1A: Scheme of Continuous Evaluation (CE)Scheme of Evaluation Pattern

Sub-components	Maximum Marks	Conditions for passing
Project Demonstration and Viva Voce	40	A learner must be present for each of the sub- components
Total	40	

Table 1B: Scheme of Semester End Examination (SEE) Evaluation Question Paper
Pattern for Semester End Examination (SEE)
Maximum Marks: 60 **Duration: 2 Hrs.**

Note: All questions are compulsory. Each question has an internal choice.

Q.1.		Attempt any three of the following	(15)
	a)		
	b)		
	c)		
	d)		
	e)		
		Attempt any three of the following	(15)
Q.2.	a)		
	b)		
	c)		
	d)		
	e)		
		Attempt any three of the following	(15)
Q.3.	a)		
	b)		
	c)		
	d)		
	e)		
		Attempt any three of the following	(15)
Q.4.	a)		
	b)		
	c)		
	d)		
	e)		