Quality Assurance (QA) Engineer – 100+ Lab Exercises (Basic, Intermediate, Advanced)

☐ Basic Level (30+ Exercises)

Objective: Build foundational QA knowledge including manual testing techniques, bug tracking, and basic automation concepts.

Fundamentals of QA

- Understand Software Development Life Cycle (SDLC) and Software Testing Life Cycle (STLC).
- Learn types of testing: functional vs non-functional.
- Write clear and effective test cases.
- Practice test case execution and defect reporting.
- Use bug tracking tools (JIRA, Bugzilla).

Manual Testing Basics

- Perform smoke, sanity, regression, and exploratory testing.
- Conduct boundary value analysis and equivalence partitioning.
- Execute positive and negative test scenarios.
- Validate UI elements across different browsers.
- Practice basic database validation using SQL queries.

Introduction to Test Automation

- Understand automation benefits and frameworks.
- Setup Selenium WebDriver environment.
- Automate simple UI test scripts.
- Capture screenshots and logs during test execution.
- Integrate basic assertions for validation.

☐ Intermediate Level (40+ Exercises)

Objective: Enhance automation skills, API testing, continuous integration, and performance testing fundamentals.

Advanced Automation

- Develop data-driven and keyword-driven test scripts.
- Implement Page Object Model (POM) design pattern.
- Use Selenium Grid for parallel test execution.
- Introduce BDD with Cucumber and Gherkin syntax.
- Automate mobile testing basics with Appium.

API Testing

- Understand RESTful API architecture.
- Use Postman for API testing and automation.
- Validate JSON/XML responses with assertions.
- Automate API tests with REST-assured or Karate framework.
- Implement API chaining and environment management.

Performance & Load Testing

- Setup JMeter for basic load testing.
- Create test plans and simulate concurrent users.
- Analyze response time, throughput, and error rates.
- Perform stress and endurance testing.
- Generate and interpret performance reports.

CI/CD & Test Management

- Integrate test automation with Jenkins pipelines.
- Automate test execution on code commits.
- Use Docker containers for test environment setup.
- Manage test suites using TestRail or Zephyr.
- Generate test coverage and defect metrics dashboards.

☐ Advanced Level (40+ Exercises)

Objective: Master advanced test automation architecture, security testing, AI-driven testing, and quality engineering principles.

Advanced Automation Frameworks

- Build scalable hybrid automation frameworks.
- Implement custom reporting with ExtentReports or Allure.
- Integrate test automation with cloud platforms (BrowserStack, Sauce Labs).
- Use Selenium WebDriver with JavaScript (WebDriverIO) or Python (Pytest).
- Automate cross-browser and cross-platform testing.

Security & Penetration Testing

- Perform vulnerability scanning with OWASP ZAP or Burp Suite.
- Understand common security threats (XSS, SQL Injection).
- Automate security test cases.
- Validate authentication and authorization mechanisms.
- Conduct API security testing.

AI & ML in Testing

- Use AI tools for test case generation.
- Implement AI-powered test maintenance.
- Apply machine learning for anomaly detection in test results.
- Explore scriptless automation platforms.
- Analyze test data trends using analytics.

Quality Engineering & DevOps Integration

- Shift-left testing practices.
- Implement test-driven development (TDD) and behavior-driven development (BDD).
- Collaborate with DevOps teams for continuous quality.
- Automate infrastructure testing with tools like Terraform or Ansible.
- Use monitoring tools to validate production quality.

Capstone Projects

- Automate end-to-end testing of an e-commerce web application.
- Build an API testing suite with data-driven tests.
- Create performance test scripts simulating real-world load.
- Develop a security test plan for a banking application.
- Implement a full CI/CD pipeline integrating automated tests.

☐ Tools & Technologies

- Selenium WebDriver, Appium, JUnit, TestNG, Cucumber
- Postman, REST-assured, Karate
- JMeter, LoadRunner
- Jenkins, Docker, Kubernetes
- OWASP ZAP, Burp Suite
- JIRA, TestRail, Zephyr