1A: Selenium Basics

1

What is Selenium and its components?

Selenium is an open-source toolset used to automate web applications. It has 4 main parts: Selenium IDE (record/playback), RC (server-based tool, now outdated), WebDriver (direct browser control using native APIs), and Grid (run tests across multiple machines in parallel).

2

Difference between Selenium IDE, RC, WebDriver, and Grid

IDE is a simple recording tool. RC needed a server and was slow. WebDriver controls browsers natively without server dependency. Grid allows tests to run on different machines simultaneously for faster execution.

3

What are locators in Selenium?

Locators are methods to identify web elements. Selenium supports ID, Name, ClassName, TagName, LinkText, PartialLinkText, XPath, and CSS Selector to find elements on the page.

4

Difference between findElement() and findElements()

findElement() fetches the first matching element or throws an exception if not found. findElements() returns a list of elements and gives an empty list if no matches are found.

5

What is Page Object Model (POM)?

POM is a design pattern where each page of the application is represented as a class with WebElements and methods, making tests reusable, readable, and easy to maintain.

1B: Selenium Basics

1

How do you handle dropdowns?

Selenium provides the Select class to handle dropdowns. You can select options by visible text, value, or index using methods like selectByVisibleText().

2

What are waits in Selenium?

Waits handle synchronization issues. Implicit Wait sets a global timeout. Explicit Wait waits for specific conditions. Fluent Wait is like Explicit but allows polling frequency and exception handling.

3

Difference between driver.close() and driver.quit()

close() closes only the current browser window. quit() closes all windows and ends the WebDriver session completely.

4

What is synchronization in Selenium?

Synchronization aligns Selenium's execution with web application speed by using waits, avoiding ElementNotFound errors due to slow loading pages.

5

Can Selenium test desktop apps?

No. Selenium is designed only for web applications. For desktop apps, tools like WinAppDriver, Winium, or AutoIt are used.

1C: Selenium Basics (Part 3)

1 **What is the purpose of Actions class?**

The Actions class simulates complex user actions such as mouse hover, drag-and-drop, right-click, and double-click events in Selenium.

2 **How do you perform drag and drop?**

Using Actions class:

```
Actions action = new Actions(driver);
action.dragAndDrop(source, target).perform();
```

It clicks the source element and drops it on the target.

3 **How do you switch to frames?**

You can switch to frames using frame name, frame index, or WebElement reference with driver.switchTo().frame() method.

4 **How do you handle browser notifications/popups?**

Browser notifications can be disabled by setting browser options, like ChromeOptions().addArguments("--disable-notifications").

5 **How do you capture screenshots?**

Use TakesScreenshot interface:

```
TakesScreenshot ts = (TakesScreenshot) driver;
File src = ts.getScreenshotAs(OutputType.FILE);
```

This captures the current screen.

2A: XPath & Web Elements (Part 1)

1

What is XPath?

XPath is a language to locate elements in an XML or HTML document. In Selenium, XPath is heavily used when other locators like ID or Name are not reliable.

2

Difference between absolute and relative XPath

Absolute XPath starts from the root (html/body/div...), prone to break easily. Relative XPath starts anywhere in DOM (//div[@class='menu']), making it more flexible.

3

Use of contains() and starts-with() in XPath

contains() is useful when attribute values are partially dynamic. starts-with() is used when you know the starting pattern of attribute values.

4

Write XPath to find a button with specific text

Example:

```
//button[text()='Submit']
```

It finds the button where exact text is "Submit".

5

How to write dynamic XPath?

Combine functions like contains(), starts-with() and logical operators (and, or) to create XPath that adapts to minor UI changes.

2B: XPath & Web Elements (Part 2)

1

What are XPath axes?

XPath axes like parent, child, following-sibling, preceding are used to navigate DOM tree relative to a particular node.

2

Difference between XPath and CSS Selector

XPath can traverse both forward and backward in DOM, while CSS can only move forward (child to descendant). XPath is slower but more powerful.

3

How do you locate hidden elements?

You can use JavaScriptExecutor to manipulate visibility or interact with parent elements containing hidden fields.

4

What is StaleElementReferenceException?

It occurs when the WebElement was available during page load but got detached from DOM later. You must re-locate the element.

5

How do you resolve ElementNotInteractableException?

Wait for element visibility or use JavaScript click if direct interaction fails.

2C: XPath & Web Elements (Part 3)

1

How to highlight a WebElement using JavaScript?

Example:

```
JavascriptExecutor js = (JavascriptExecutor) driver;
js.executeScript("arguments[0].style.border='3px solid red'", element);
```

Highlights the element visually during tests.

2

How do you validate a tooltip?

Fetch the title attribute of the element using getAttribute("title") and assert the value.

3

Scroll to element using JavaScriptExecutor

Use:

```
js.executeScript("arguments[0].scrollIntoView(true);", element);
```

Brings the element into the visible area.

4

Capture all links on a page

Find elements with tagName a and extract href attributes.

5

How to verify broken links?

Send HTTP requests to extracted URLs and check for valid response codes (200 OK expected).

3A: Selenium Java Coding (Part 1)

1

Login test using POM

Create separate page classes for login screen (LoginPage.java) and invoke methods in your test class to enter username, password, and click login.

2

Click all checkboxes on a page

Use driver.findElements(By.xpath("//input[@type='checkbox']")).click() inside a loop to click each checkbox.

3

Upload file in Selenium

Directly send the file path to file input:

```
driver.findElement(By.id("upload")).sendKeys("path/to/file.txt");
```

4

Handle multiple windows/tabs

Get all window handles and switch:

```
for(String handle : driver.getWindowHandles()){
    driver.switchTo().window(handle);
}
```

5

Handle calendar date pickers

Directly pick the date if possible; otherwise, send JavaScript to set date field value.

3B: Selenium Java Coding (Part 2)

1

Capture and save screenshot on failure

Capture screenshot inside a catch block or @AfterMethod when a test fails to help debugging.

2

Retry failed test using listener

Implement IRetryAnalyzer interface and link it to TestNG listeners to auto-retry flaky tests.

3

Handle autocomplete dropdown

Send partial input, wait for dropdown options, and select matching option via click.

4

Extract dynamic table data

Use loops to traverse table rows and columns dynamically using XPath expressions.

5

Hover over an element

Use Actions class:

```
Actions act = new Actions(driver);
act.moveToElement(element).perform();
```

3C: Selenium Java Coding (Part 3)

1

Validate all dropdown options

Fetch all options using Select class and verify them against expected values.

2

Highlight a failed element

Change element's CSS border using JavaScriptExecutor to indicate failure visually.

3

Scroll and validate lazy-loaded content

Scroll page by JavaScript or Actions class to trigger loading of dynamic content.

4

Use of soft assertions

SoftAssert allows the test to continue execution even after one assertion fails, collecting all failures at once.

5

Add FluentWait for a WebElement

Create FluentWait with polling interval and ignore exceptions like NoSuchElementException until timeout.

4A: Core Java Concepts (Part 1)

1

Difference between List, Set, and Map

List stores ordered elements and allows duplicates. Set stores unique elements with no particular order. Map stores key-value pairs where keys must be unique.

2

HashMap vs Hashtable

HashMap is non-synchronized, faster, and allows one null key and multiple null values. Hashtable is synchronized (thread-safe) but slower and does not allow any null key or value.

3

ArrayList vs LinkedList

ArrayList is better for accessing elements (random access), whereas LinkedList is faster for insertions and deletions due to its node-based structure.

4

What is method overloading?

Method overloading means creating multiple methods in the same class with the same name but different parameters (different type or number).

5

What is method overriding?

Method overriding means redefining a parent class method in a child class with the same method signature to provide a specific implementation.

4B: Core Java Concepts (Part 2)

1

What are interfaces in Java?

An interface in Java is a blueprint of a class with abstract methods. A class implements an interface to inherit its abstract methods, achieving full abstraction and multiple inheritance.

2

Abstract class vs Interface

Abstract class can have both abstract and concrete methods. Interfaces can only have abstract methods (until Java 8) and support multiple inheritance, unlike abstract classes.

3

What are static blocks?

Static blocks are used to initialize static variables. They are executed once when the class is loaded into memory before the constructor or main method.

4

Difference between final, finally, and finalize

final is used to declare constants or prevent inheritance. finally is a block that executes after a try-catch block, regardless of exceptions. finalize() is a method called by Garbage Collector before object destruction.

5

What is polymorphism?

Polymorphism means the ability of an object to take multiple forms — achieved via method overloading (compile-time polymorphism) and method overriding (runtime polymorphism).

4C: Core Java Concepts (Part 3)

1

Use of this and super keywords

this refers to the current class instance. super refers to the immediate parent class object and is used to access parent methods or constructors.

2

Exception handling in Java

Java provides try-catch-finally blocks to handle exceptions. This helps prevent program crashes and allows alternative code execution when exceptions occur.

3

What are collections in Java?

Collections are frameworks that provide architecture to store and manipulate groups of objects. Key interfaces include List, Set, and Map.

4

Purpose of wrapper classes

Wrapper classes like Integer, Double, Character wrap primitive data types into objects so they can be used in collections, which require objects.

5

What are lambda expressions?

Lambda expressions provide a concise way to represent functional interfaces, making code easier to read and write in Java 8+. Example:

```
(int a, int b) -> a + b;
```

5A: Java Coding Exercises (Part 1)

1

Reverse a string

You can reverse a string by converting it to a character array and swapping elements or by using StringBuilder's reverse() method. Example:

```
new StringBuilder("hello").reverse().toString();
```

2

Count frequency of characters in a string

Use a HashMap to store characters as keys and their counts as values by iterating through the string.

3

Find duplicates in an array

Use a HashSet. If add() returns false for an element, it's a duplicate.

4

Find second largest number in an array

Traverse the array while maintaining two variables — one for the largest and another for the second largest value.

5

Palindrome check

Compare the original string to its reverse. If both are equal, it is a palindrome.

5B: Java Coding Exercises (Part 2)

1

Implement binary search

Binary search works by dividing a sorted array and comparing the mid element to the target. Adjust search range based on comparison.

2

Convert HashMap to List

Use:

```
List keys = new ArrayList<>(hashMap.keySet());
List values = new ArrayList<>(hashMap.values());
```

to extract keys or values into a list.

3

Swap two numbers without using a third variable

Use arithmetic:

```
a = a + b;
b = a - b;
a = a - b;
```

4

Remove duplicates from a list

Convert list to a HashSet and then back to a list:

```
new ArrayList<>(new HashSet<>(list));
```

5

Count vowels and consonants in a string

Loop through the string. If the character is a vowel (a, e, i, o, u), increment vowel count; otherwise, if it's a letter, increment consonant count.

5C: Java Coding Exercises (Part 3)

1

Factorial using recursion

Example:

```
int factorial(int n){
    if(n==0) return 1;
    return n * factorial(n-1);
}
```

2

Print Fibonacci series

Start with 0 and 1, then print the sum of last two numbers iteratively.

3

Sort a list alphabetically

Use Collections.sort():

```
Collections.sort(list);
```

4

Merge two sorted arrays

Create a new array, compare elements of both input arrays, and insert the smaller one first.

5

Create a custom exception class

Extend the Exception class:

```
class MyException extends Exception {
    public MyException(String message) {
        super(message);
    }
}
```

6A: TestNG Essentials (Part 1)

1

What is TestNG?

TestNG (Test Next Generation) is a powerful testing framework for Java, inspired by JUnit but with additional features like parallel execution, groups, priorities, dependency testing, and flexible reporting.

2

TestNG vs JUnit

TestNG offers more flexible configuration (with XML), parallel test execution, better annotations, built-in dependency management between tests, and custom reporting compared to the basic structure of JUnit.

3

Common TestNG annotations

- @Test: Marks a test method.
- @BeforeMethod/@AfterMethod: Run before and after every test method.
- @BeforeClass/@AfterClass: Run before and after all test methods in a class.
- @BeforeSuite/@AfterSuite: Run before and after all tests in the suite.

4

What is a TestNG XML suite file?

TestNG XML lets you define which classes, methods, and groups to execute, configure parallel execution, and set parameters for your tests — all externally without modifying code.

5

How do you group test cases in TestNG?

You use the groups attribute inside @Test. In XML, you can include or exclude specific groups to run only selected tests.

6B: TestNG Essentials (Part 2)

1

How to run tests in parallel in TestNG?

Add parallel="methods" or parallel="classes" attribute in your suite XML and specify thread-count. This runs tests or classes simultaneously.

2

What is a DataProvider in TestNG?

DataProvider is a TestNG feature to supply multiple sets of test data to a single test method, enabling data-driven testing easily.

3

How to skip a test case in TestNG?

Set enabled=false inside the @Test annotation or throw a SkipException during runtime based on a certain condition.

4

SoftAssert vs Assert

Assert stops the test immediately on failure. SoftAssert continues test execution even after an assertion failure, collecting all errors to be reported at the end.

5

How do you use IRetryAnalyzer?

Implement IRetryAnalyzer interface to automatically retry failed test cases a certain number of times before marking them as failed.

6C: TestNG Essentials (Part 3)

1

Dependency between test methods

Use dependsOnMethods in @Test to define that one test should run only after another succeeds. If the parent fails, the dependent test is skipped.

2

TestNG Listeners

Listeners are interfaces like ITestListener, ISuiteListener that help capture test events like success, failure, start, and finish — useful for reporting or screenshots on failure.

3

Execution order control in TestNG

Use the priority attribute in @Test. Lower priority values run first. If priority isn't specified, methods run alphabetically.

4

Prioritization of test cases

Assign integer priority to tests (priority=1, priority=2). Tests execute based on ascending priority order, helping in controlled execution.

5

Generating TestNG reports

TestNG automatically creates HTML and XML reports after test execution. These reports provide test results summary, details, and can be customized further.

7A: Maven Essentials (Part 1)

1

What is Maven and its purpose?

Maven is a build and dependency management tool that automates compiling, testing, packaging, and deploying Java projects, while also managing external libraries efficiently through a simple XML configuration.

2

What is pom.xml?

pom.xml is the core configuration file of Maven projects where dependencies, plugins, build instructions, and project info are declared.

3

What are dependencies in Maven?

Dependencies are external libraries required by a project (like Selenium, TestNG). Maven automatically downloads these from central repositories.

4

Life cycle phases of Maven

- validate: Check project structure.
- compile: Compile source code.
- test: Run unit tests.
- package: Create JAR/WAR.
- verify: Check integration tests.
- install: Install to local repo.
- deploy: Upload to remote repo.

5

Maven commands: clean, install, test

- mvn clean: Deletes target folder.
- mvn install: Builds and installs locally.
- mvn test: Runs unit or automation tests.

7B: Maven Essentials (Part 2)

1 **What is a repository in Maven?**

A repository is a place where Maven stores project artifacts (JARs, libraries). Repositories can be local (user machine) or remote (online servers like Maven Central).

2 **Local vs Remote Repository**

Local repo is on your machine (default: .m2 folder). Remote repo is online like Maven Central. Maven checks local first, then remote.

3 **How to add TestNG dependency in Maven?**

Add this to pom.xml:

```
org.testng
testng
7.4.0
```

4 **What is Maven Surefire Plugin?**

It runs unit tests automatically during Maven build. Useful for executing TestNG or JUnit test classes.

5 **How to skip test execution in Maven?**

Use command:

```
mvn install -DskipTests
```

to compile and package code without running tests.

7C: Maven Essentials (Part 3)

1

What are Maven profiles?

Profiles allow setting different configurations (like dev, QA, production) which can be activated by command-line switches during build.

2

Parent and Child POM concept

A Parent POM defines common configurations. Child modules inherit from the parent, promoting reusability and reducing duplication across projects.

3

Creating a Maven project manually

Run:

```
mvn archetype:generate
```

and follow prompts for project creation like groupId, artifactId.

4

Managing dependency versions via Maven

Declare versions in block in parent POM to ensure uniform versioning across child modules.

5

Maven integration with Jenkins

Jenkins can invoke Maven goals like clean, install, and test during build pipelines for continuous integration automation.

8A: Cucumber & BDD (Part 1)

1

What is BDD?

BDD (Behavior Driven Development) is a development approach that enhances collaboration between developers, testers, and business stakeholders by writing scenarios in plain English that describe application behavior.

2

What is Cucumber?

Cucumber is an open-source tool that supports BDD. It reads specifications written in Gherkin language and runs corresponding automation scripts behind them.

3

What is Gherkin?

Gherkin is a simple, readable language used to write Cucumber test scenarios. It uses keywords like Given, When, Then, And, But to define steps.

4

Structure of a feature file

A feature file contains:

- Feature: Title of the functionality.
- Scenario: Specific test case.
- Steps: Series of Given-When-Then statements describing actions and expected outcomes.

5

What is a step definition?

A step definition links Gherkin steps to Java methods. When Cucumber encounters a step in the feature file, it calls the matching step definition code.

8B: Cucumber & BDD (Part 2)

1

What are hooks in Cucumber?

Hooks (@Before, @After) are blocks of code executed before and after each scenario. They are commonly used for setup (like launching browsers) and teardown (like closing browsers).

2

What is Background in Cucumber?

Background allows you to define common steps that run before each scenario in a feature file, reducing duplication of Given conditions.

3

What is a Scenario Outline?

Scenario Outline lets you run the same scenario multiple times with different sets of data. Data is provided using an Examples table.

4

How to use tags in Cucumber?

Tags (e.g., @SmokeTest) allow grouping of scenarios so you can control which scenarios to execute by including/excluding tags in Runner file.

5

Integration of Cucumber with TestNG

Use the AbstractTestNGCucumberTests class to run Cucumber feature files with TestNG, enabling you to use TestNG's features like parallel execution.

8C: Cucumber & BDD (Part 3)

1

Data tables in Cucumber

DataTables are used to pass complex input data (like multiple rows of inputs) to step definitions in a structured form, supporting maps and lists.

2

Generating Cucumber reports

Cucumber can generate basic HTML reports. For advanced reports, integrate plugins like ExtentReports, Cucumber Reporting Plugin, or Allure.

3

Use of Runner class in Cucumber

Runner class, annotated with @RunWith and @CucumberOptions, configures which features to run, sets paths for feature files and step definitions, and controls report generation.

4

How to reuse steps across scenarios

Define common step definitions in a separate package and reference them from multiple scenarios or feature files to promote reusability.

5

Cucumber options explained

Options like features, glue, tags, plugin, monochrome, and strict control feature path, step binding, report output, and execution behavior.

9A: Git & GitHub (Part 1)

1

What is Git?

Git is a distributed version control system that tracks changes to files and allows multiple developers to work together on a project efficiently.

2

Initialize a Git repo

Use:

```
git init
```

to initialize a new local repository.

3

git clone, git pull, git push

- git clone: Copies a remote repo locally.
- git pull: Fetches latest changes and merges.
- git push: Uploads your local commits to the remote repo.

4

Difference between fetch and pull

fetch only downloads new data; it doesn't integrate it. pull fetches and merges changes automatically.

5

What is .gitignore?

A file listing paths to be ignored by Git, preventing unnecessary or sensitive files (like logs, .class files) from being tracked.

9B: Git & GitHub (Part 2)

1 **Creating and switching branches**

Use:

```
git checkout -b new-branch-name
```

to create and switch to a new branch in one command.

2 **Merging branches**

Use:

```
git checkout main
git merge feature-branch
```

to merge changes from one branch into another.

3 **Resolving merge conflicts**

Manually edit the conflicting files, mark conflicts as resolved, and commit the changes after reviewing.

4 **What is git stash?**

Temporarily saves uncommitted changes to clean the working directory without committing them.

5 **How to revert a commit**

Use:

```
git revert commit_hash
```

to undo changes made by a specific commit without rewriting history.

9C: Git & GitHub (Part 3)

1

GitHub vs GitLab

GitHub is the most popular cloud-based Git hosting service. GitLab provides similar features but with built-in CI/CD pipelines and more control over private hosting.

2

Pull request vs merge

A pull request is a request to merge code changes into another branch after review. Merging is the actual combining of branch changes.

3

Forking a repo

Forking creates your own copy of someone else's repository on GitHub, allowing you to freely experiment without affecting the original.

4

Setting upstream remote

Use:

```
git remote add upstream original_repo_url
```

to track and fetch changes from the original repository you forked.

5

Tagging releases in Git

Use:

```
git tag -a v1.0 -m "Release version 1.0"
```

to create a versioned snapshot of the project for release.

10A: Agile & Scrum (Part 1)

1

What is Agile?

Agile is an iterative and incremental software development methodology emphasizing collaboration, flexibility, continuous feedback, and delivering working software in small, frequent releases.

2

Agile vs Waterfall

Waterfall is linear and sequential with late feedback, while Agile is flexible, iterative, and allows continuous customer involvement and feedback at every stage.

3

Scrum roles: PO, SM, Dev Team

- **Product Owner:** Defines product vision and backlog.
- **Scrum Master:** Facilitates scrum practices, removes impediments.
- **Development Team:** Delivers potentially shippable increments every sprint.

4

What is a user story?

A user story describes a feature or requirement from an end-user perspective. It usually follows the format: "As a [user], I want [goal] so that [reason]."

5

Definition of Done

A shared understanding within the team of what must be completed for a user story to be considered finished — includes coding, testing, reviews, and documentation.

10B: Agile & Scrum (Part 2)

1

What is Sprint Planning?

Sprint Planning is a meeting at the start of a sprint where the team selects and commits to backlog items (user stories) they plan to deliver.

2

What is a Daily Standup?

A 15-minute team meeting held every day of the sprint where team members answer three questions:

- What did you do yesterday?
- What will you do today?
- Any blockers?

3

What is a Sprint Review?

A meeting at the end of the sprint to showcase the completed work to stakeholders and gather feedback for future improvements.

4

What is a Sprint Retrospective?

A meeting after Sprint Review where the team reflects on the sprint process and discusses what went well, what didn't, and how to improve.

5

Product Backlog vs Sprint Backlog

- **Product Backlog**: List of all desired work on the project.
- **Sprint Backlog**: Subset of product backlog items selected for the current sprint.

10C: Agile & Scrum (Part 3)

1

Story points estimation

Story points estimate the relative complexity or effort of a user story, typically using Fibonacci sequence (1, 2, 3, 5, 8, etc.).

2

Burndown chart

A graphical representation showing the remaining work in the sprint over time, helping the team track progress.

3

Acceptance criteria

Conditions that a user story must satisfy to be accepted as complete by the Product Owner.

4

What is backlog grooming?

Regular sessions where the team refines, prioritizes, estimates, and clarifies items in the product backlog.

5

Velocity tracking

Measurement of the number of story points completed by a team in a sprint, used for future sprint planning and forecasting.

11A: STLC & Bug Lifecycle (Part 1)

1

What is STLC?

Software Testing Life Cycle (STLC) defines a sequence of activities conducted during software testing, from requirement analysis to test closure, ensuring structured and systematic testing.

2

Phases in STLC

- Requirement Analysis
- Test Planning
- Test Case Design
- Test Environment Setup
- Test Execution
- Test Cycle Closure

3

Entry and Exit criteria in STLC

Entry criteria are preconditions to start a phase (e.g., approved requirements). Exit criteria define conditions to mark a phase as completed (e.g., 100% test cases executed).

4

What is a test plan?

A test plan is a detailed document describing the test strategy, scope, objectives, resources, schedules, deliverables, and risks related to the testing process.

5

What is a test case?

A test case is a document specifying input, execution conditions, testing procedure, and expected results to validate a particular feature or functionality.

11B: STLC & Bug Lifecycle (Part 2)

1 **What is a test strategy?**

A high-level document outlining the testing approach of the organization, covering testing levels, types, tools, metrics, and risk management.

2 **What is test data?**

Test data consists of input values that are used to execute test cases. Good test data improves the quality and coverage of testing.

3 **How do you maintain test artifacts?**

Test artifacts like test cases, test scripts, and test results are maintained using version control tools like Git, test management tools like Jira, or stored in repositories.

4 **What is defect lifecycle?**

Defect lifecycle is the journey of a defect through stages like New → Assigned → Open → Fixed → Retest → Verified → Closed or Reopen.

5 **Bug states from discovery to closure**

- New
- Assigned
- Open
- Fixed
- Retested
- Verified
- Closed

11C: STLC & Bug Lifecycle (Part 3)

1

Severity vs Priority

Severity defines the impact of the bug on functionality. Priority defines how urgently the bug needs to be fixed. High severity does not always mean high priority.

2

Blocker vs Critical bug

A Blocker stops all progress (e.g., application crash). A Critical bug severely impacts functionality but might have a workaround.

3

Duplicate bug handling

Duplicate bugs are marked and closed after verifying that the issue already exists or is being tracked under another bug ID.

4

Defect triage meeting

A meeting where defects are discussed, prioritized, and assigned based on severity, priority, and business impact with stakeholders like Dev, QA, and Product Owners.

5

How do you write a good bug report?

A good bug report includes a clear title, reproducible steps, expected vs actual results, environment details, severity, screenshots/logs, and should be concise and objective.

12A: Framework Design (Part 1)

1

What is a test automation framework?

It's a set of guidelines, practices, and tools designed to make automation tests efficient, reusable, and maintainable. Examples include POM, Data-Driven, Hybrid frameworks.

2

Types of automation frameworks

- Linear
- Modular
- Data-Driven
- Keyword-Driven
- Hybrid
- BDD Frameworks like Cucumber

3

Folder structure in a Selenium framework

Common folders:

- src/main/java for framework code
- src/test/java for test cases
- resources for configurations
- reports for output
- drivers for WebDriver binaries

4

What is PageFactory in Selenium?

PageFactory helps initialize WebElements using @FindBy annotations. It improves code readability and manages page element initialization effectively.

5

Config file management

Properties files (.properties) or YAML files are used to externalize environment-specific data like URLs, credentials, and timeouts for easier maintenance.

12B: Framework Design (Part 2)

1

Reusable utility classes

Utilities like WaitHelper, ScreenshotHelper, ExcelReader are created separately to reuse common functionalities across different tests.

2

Data handling via Excel/JSON

Test data is stored in Excel (using Apache POI) or JSON (using Jackson/GSON libraries) to allow data-driven testing.

3

Logging using Log4j

Log4j is used to record important events like test execution status, errors, and debug info, making troubleshooting faster.

4

Exception handling in frameworks

Exceptions like NoSuchElementException are handled gracefully using try-catch blocks and custom recovery strategies to make frameworks stable.

5

Test reports (Extent/Allure)

Extent Reports and Allure Reports offer rich HTML reports with pass/fail status, screenshots on failure, and pie charts for test results visualization.

12C: Framework Design (Part 3)

1. **How to make your framework scalable**

   By following modularity, reusability, centralized configurations, and clear naming conventions, frameworks can be easily expanded for bigger projects.

2. **Version control integration**

   Integrating frameworks with Git ensures code collaboration, branching, merging, and change tracking among multiple team members.

3. **Modularizing your tests**

   Breaking down large tests into small reusable methods improves maintainability and supports better test data parameterization.

4. **Running tests in parallel**

   Tools like TestNG (parallel methods/classes) and Selenium Grid allow running multiple tests simultaneously, saving execution time.

5. **Framework CI/CD readiness**

   Frameworks should support Jenkins/Bamboo integrations, allowing automated test execution on code commits or scheduled nightly runs.

13A: Jenkins & CI/CD (Part 1)

1

What is Jenkins?

Jenkins is an open-source automation server used to build, test, and deploy code automatically as part of continuous integration and continuous delivery pipelines.

2

How to set up a Jenkins job?

Create a new job, configure SCM (like Git), define build triggers (poll SCM, schedule builds), and add build steps (like Maven goals or shell commands).

3

Trigger builds using Git

Configure webhook on GitHub or GitLab to automatically trigger Jenkins builds on every push to the repository.

4

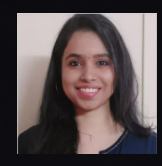
Run Maven project in Jenkins

Add mvn clean install or mvn test as a build step in Jenkins to compile code and run automated tests.

5

Generate TestNG reports in Jenkins

Post-build actions allow publishing TestNG result XMLs as readable HTML reports or integrating Extent/Allure reports for enhanced visualization.



13B: Jenkins & CI/CD (Part 2)

1

Email notifications after builds

Use the Jenkins Email Extension Plugin to notify developers of build status via emails — successful, unstable, or failed.

2

Pipeline jobs vs freestyle jobs

Pipeline jobs use code-as-configuration (Jenkinsfile) to define build logic, whereas freestyle jobs are simple UI-configured jobs.

3

Jenkins plugins used in test automation

Common plugins include Maven Integration, Git, Email Extension, Allure Report, HTML Publisher, Build Pipeline Plugin.

4

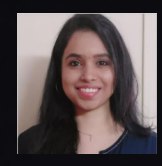
Scheduling builds (cron syntax)

Jenkins supports CRON expressions like H 1 * * * to schedule periodic jobs (e.g., nightly builds).

5

Handling test failures in Jenkins

Configure jobs to mark builds as unstable on test failures and use retry mechanisms or rerun failed test suites.



13C: Jenkins & CI/CD (Part 3)

1

How to archive artifacts

In Post-Build Actions, select "Archive Artifacts" and specify files like test reports or JARs to retain them even after builds are completed.

2

Slack/email integration

Integrate Jenkins with Slack or Email servers to get real-time notifications about build statuses, deployments, or test results.

3

Jenkinsfile basics

Jenkinsfile is a text file that defines the stages and steps of a pipeline using either Declarative or Scripted syntax.

4

Shared libraries in Jenkins

Shared libraries allow sharing reusable Groovy functions across multiple Jenkins pipelines, improving maintainability.

5

Running parallel jobs

Jenkins pipeline allows stages to run in parallel using parallel blocks, speeding up build and test execution.

14A: REST API & Rest Assured (Part 1)

1

What is an API?

An API (Application Programming Interface) allows two software systems to communicate with each other, exposing data and functionality without sharing internal details.

2

What is REST?

REST (Representational State Transfer) is an architectural style for APIs that uses HTTP methods like GET, POST, PUT, DELETE to perform CRUD operations on resources.

3

What is Rest Assured?

Rest Assured is a popular Java library used to test RESTful APIs. It simplifies sending HTTP requests, validating responses, and automating API testing easily without extensive boilerplate code.

4

Common HTTP methods used

- GET: Retrieve data
- POST: Create new data
- PUT: Update existing data
- DELETE: Remove data

5

How to validate status code with Rest Assured

Example:

```
given().when().get("/users").then().statusCode(200);
```

It checks that the API response has a status code of 200 (OK).

14B: REST API & Rest Assured (Part 2)

1 **How to send query parameters**

Use queryParam() method to send key-value pairs in the request URL:

```
given().queryParam("page",2).when().get("/users");
```

2 **How to send headers in API requests**

Use header() or headers() method to set required request headers like Authorization, Content-Type, etc.

3 **Validating JSON response body**

Use body() method:

```
given().when().get("/users").then().body("data.id", equalTo(1));
```

to validate response fields.

4 **Handling authentication in Rest Assured**

You can set Basic Auth using:

```
given().auth().basic("username","password")
```

for secured APIs.

5 **How to log request and response**

Use log().all() method to print complete request and response data for easier debugging.

14C: REST API & Rest Assured (Part 3)

1 **Sending POST request with body**

Example:

```
given().body(jsonBody).post("/users");
```

where jsonBody is a String or JSON object payload.

2 **Path parameters in Rest Assured**

Use pathParam() to replace parts of the URL dynamically:

```
given().pathParam("userId",2).get("/users/{userId}");
```

3 **What is JSONPath?**

JSONPath is a query language to extract parts of a JSON document easily, similar to XPath for XML.

4 **Serialization and Deserialization**

Serialization: Java object JSON Deserialization: JSON Java object (using libraries like Jackson or Gson with Rest Assured).

5 **How to validate response headers**

Example:

```
given().when().get("/users").then().header("Content-Type","application/json; charset=utf-8");
```

15A: Real World QA Questions (Part 1)

1 **Tell me about your recent testing project**

Describe the domain, your role (e.g., Automation Engineer), the tech stack (Selenium, Rest Assured, TestNG), and your key contributions like framework development, CI/CD integration, and handling critical defects.

2 **What was the most challenging bug you found?**

Mention a complex, hard-to-reproduce bug, how you found it (e.g., through exploratory or edge case testing), and how it impacted the system.

3 **How do you convince a developer that it is a bug?**

Present reproducible steps, logs, screenshots, and how the behavior deviates from the requirement/user story acceptance criteria objectively and collaboratively.

4 **How do you prioritize test cases for execution?**

Based on risk, business criticality, defect-prone modules, customer usage frequency, and recent code changes (risk-based testing).

5 **How do you perform API vs UI testing?**

API testing is faster, stable, and validates business logic directly. UI testing covers user workflows but is slower and more fragile. Both complement each other.

15B: Real World QA Questions (Part 2)

1 **How do you handle unstable tests in automation?**

Root cause analysis, fixing timing issues with explicit waits, avoiding hardcoding, stabilizing test data, and isolating environment dependencies.

2 **How do you review a test case?**

Check for clarity, completeness, traceability to requirements, correct positive/negative scenarios, and minimal redundancy.

3 **How do you handle dynamic elements in Selenium?**

Use dynamic XPath with contains(), starts-with(), JavaScriptExecutor if necessary, or wait for elements dynamically.

4 **What is risk-based testing?**

Testing focused on features with the highest business impact or most prone to failure, maximizing coverage with limited resources.

5 **How do you contribute during sprint planning?**

Analyze user stories, estimate testing effort, identify potential risks early, ask clarifying questions, and ensure acceptance criteria are clear.

15C: Real World QA Questions (Part 3)

1 **When do you automate a test case?**

Automate when test cases are stable, repetitive, regression-critical, and high-volume, ensuring ROI justifies the automation effort.

2 **How do you manage flaky tests?**

Regular monitoring, logging root causes, improving synchronization, isolating environment issues, and stabilizing data sources.

3 **Key qualities of a good QA Engineer**

Attention to detail, strong analytical thinking, curiosity, excellent communication, technical skills in automation and tools, proactive mindset.

4 **Metrics you track in test automation**

Pass/fail rates, test coverage, defect leakage rate, execution time trends, flaky test rates, and CI build health metrics.

5 **Best practices in QA automation**

Follow POM, use waits properly, data-driven approach, maintain modular code, log meaningfully, integrate with CI/CD, and ensure proper reporting.

16A: Selenium Advanced (Part 1)

1 **How do you handle SSL certificate errors in Selenium?**

Set ChromeOptions or FirefoxProfile to accept insecure certificates:

```
ChromeOptions options = new ChromeOptions();
options.setAcceptInsecureCerts(true);
```

2 **How do you handle Ajax calls in Selenium?**

Use Explicit Waits with conditions like elementToBeClickable() or visibilityOfElementLocated() to wait for Ajax-loaded elements.

3 **How do you capture dynamic popups?**

Identify popup locators dynamically, use WebDriverWait to handle unpredictable popups, and sometimes use window handles if it's a new window.

4 **How do you manage cookies in Selenium?**

You can add, delete, or retrieve cookies using WebDriver's manage().getCookies(), addCookie(), and deleteAllCookies() methods.

5 **How do you maximize browser window?**

Simply use:

```
driver.manage().window().maximize();
```

to maximize the browser window after launching it.

16B: Selenium Advanced (Part 2)

1 **Handling multiple frames**

Switch into the frame first, interact with elements, and switch back to the main page:

```
driver.switchTo().frame("frameName");
driver.switchTo().defaultContent();
```

2 **How to work with alerts/pop-ups**

Use Alert interface:

```
Alert alert = driver.switchTo().alert();
alert.accept(); // or alert.dismiss();
```

3 **How to handle file download in Selenium?**

Use browser profile settings to auto-download files without popups, or integrate with tools like Robot class for download dialogs.

4 **How to run Selenium tests headlessly**

Set ChromeOptions or FirefoxOptions with headless argument:

```
options.addArguments("--headless");
```

to run tests without UI.

5 **How do you capture browser logs in Selenium?**

For ChromeDriver:

```
LogEntries logs = driver.manage().logs().get(LogType.BROWSER);
```

useful for finding console errors during tests.

16C: Selenium Advanced (Part 3)

1. **Differences between XPath and CSS**

   XPath supports traversal both upwards and downwards and is more powerful. CSS selectors are faster and simpler but can only traverse down the DOM tree.

2. **How to handle stale element reference exception**

   Re-locate the element again after the page reloads or dynamic updates happen.

3. **Shadow DOM handling in Selenium**

   Selenium WebDriver cannot directly access shadow DOM. You need to use JavaScriptExecutor to penetrate shadow roots.

4. **Capturing network traffic with Selenium**

   Integrate BrowserMob Proxy or use DevTools Protocol (Chrome DevTools) to capture network logs during test execution.

5. **How to rerun failed tests automatically**

   Implement TestNG's IRetryAnalyzer or configure rerun policies in CI pipelines like Jenkins to rerun flaky tests.

17A: Agile + Testing (Part 1)

1 **Difference between Test Plan and Test Strategy**

Test Plan is project-specific and details scope, timelines, resources. Test Strategy is organizational and describes the overall testing approach across projects.

2 **How do you participate in Agile ceremonies?**

By attending Sprint Planning, Daily Standups, Sprint Reviews, and Retrospectives, contributing to estimations, risk identification, and sprint goals.

3 **Importance of retrospectives**

Retrospectives provide a safe space for teams to reflect on what worked, what didn't, and continuously improve sprint-over-sprint.

4 **Agile Testing Quadrants**

Divides testing into four quadrants:

- Unit and component tests
- Functional tests
- System-level tests
- User acceptance tests

5 **Difference between Definition of Done and Acceptance Criteria**

Definition of Done is a checklist applicable to all stories; Acceptance Criteria are specific conditions that a story must fulfill to be considered complete.

17B: Agile + Testing (Part 2)

1

How do you estimate testing tasks in Agile?

Use story points (effort-based) or time-based estimation (hours), considering complexity, dependencies, and risk factors.

2

Pair Testing

Two testers or a tester and developer work together at a single machine to explore and test the application collaboratively.

3

Exploratory Testing

Simultaneously learning, designing, and executing tests without predefined scripts, often uncovering bugs missed in formal testing.

4

How to handle changing requirements

Maintain flexibility, adopt minimal documentation with traceability, communicate changes clearly, and update test cases/scenarios dynamically.

5

QA role during backlog grooming

Review upcoming stories, clarify acceptance criteria, provide testability feedback, and identify testing dependencies early.

17C: Agile + Testing (Part 3)

1

What is TDD?

Test-Driven Development is a software development practice where you write unit tests first, then code to make the tests pass.

2

What is BDD vs TDD?

BDD focuses on user behavior and collaboration (Given-When-Then), while TDD focuses on technical correctness via unit tests.

3

How to ensure maximum coverage in Agile

Continuously test throughout the sprint, combine API/UI/DB tests, exploratory testing, and involve non-functional testing early.

4

What is Shift-Left Testing?

Moving testing activities earlier into the software development life cycle (at the requirements, design phase) to catch defects sooner.

5

Test Pyramid concept

Pyramid suggests more unit tests, fewer integration tests, and even fewer UI tests for faster, reliable automation.

18A: Coding Questions

1. **Find missing number in an array**

   Sum expected numbers (n*(n+1)/2) and subtract actual sum from the array elements to find the missing one.

2. **Check if two strings are anagrams**

   Sort both strings and compare them, or use a character frequency map.

3. **Find duplicate elements in an array**

   Use HashSet: if add() fails, the element is a duplicate.

4. **Reverse words in a sentence**

   Split sentence by spaces, reverse the array, and join it back.

5. **Find first non-repeating character**

   Use LinkedHashMap to maintain insertion order and frequency; first entry with frequency 1 is the answer.

18B: Coding Questions (Part 2)

1

Check if a string is a palindrome

Compare the original string with its reverse. If both match, it's a palindrome. You can reverse using StringBuilder.

2

Print Fibonacci series up to N terms

Start with 0 and 1, then add the last two numbers to generate the next one iteratively.

3

Find the largest element in an array

Initialize a variable with the first element and iterate through the array updating it whenever a larger element is found.

4

Count vowels and consonants in a string

Iterate each character, check if it's a vowel (a, e, i, o, u); otherwise, if it's an alphabet, count as consonant.

5

Find the factorial of a number

Use recursion or a simple loop multiplying numbers from 1 to n.

18C: Coding Questions (Part 3)

1

Find second highest number in array

Maintain two variables — first highest and second highest — while traversing through the array.

2

Remove duplicates from a string

Use a LinkedHashSet to preserve order and remove duplicates or use a StringBuilder with a seen set.

3

Swap two numbers without a third variable

Use arithmetic operations:

```
a = a + b;
b = a - b;
a = a - b;
```

4

Reverse an integer

Extract digits one by one using modulo and division operations, and reconstruct the number.

5

Check Armstrong number

Sum of cubes of each digit equals the number itself (e.g., $153 = 1^3 + 5^3 + 3^3$).

19A: Real-World Testing Scenarios (Part 1)

1 **How do you test a login page?**

Test positive login, invalid credentials, blank fields, SQL injection, password masking, remember me functionality, and session expiration.

2 **How do you test a search functionality?**

Validate keyword search, partial match, no results scenario, pagination, filtering, and special character handling.

3 **How do you test file upload feature?**

Test uploading valid files, invalid files, large size files, empty uploads, and interruption during upload.

4 **How do you test a shopping cart?**

Add multiple items, update quantity, remove items, price recalculation, apply promo codes, check stock validation.

5 **How do you test an API without UI?**

Use tools like Postman, Rest Assured, or CURL commands to send HTTP requests and validate responses directly.

19B: Real-World Testing Scenarios (Part 2)

1 **How do you test payment gateway integration?**

Validate successful payment, declined transactions, expired card handling, incorrect OTP, network failures, and duplicate payment prevention.

2 **How do you test logout functionality?**

Ensure session is cleared, restricted access to pages after logout, auto logout on inactivity, and multiple login instances handling.

3 **How do you test multi-language support?**

Validate UI elements translation, input fields, backend data handling, currency symbols, date/time formats across different languages.

4 **How do you test mobile responsiveness?**

Test UI/UX on different screen sizes using device emulators, browser developer tools, and verify adaptive layouts.

5 **How do you test accessibility features?**

Test with screen readers, validate keyboard-only navigation, color contrast compliance, and ARIA roles for assistive technologies.

19C: Real-World Testing Scenarios (Part 3)

1

How do you test email notifications?

Validate email content, correct recipients, subject line, attachments, and that no duplicate emails are triggered.

2

How do you test user role-based access control?

Ensure users can access only allowed functionalities and restricted content is inaccessible based on role.

3

How do you test load/performance?

Use tools like JMeter or Locust to simulate multiple users and validate system response time, throughput, and server stability under load.

4

How do you test scheduled jobs or cron tasks?

Manually trigger jobs if possible, validate expected execution time, output data generation, and error handling.

5

How do you test version upgrades or deployments?

Validate backward compatibility, migration scripts, configuration changes, rollback procedures, and smoke tests post-deployment.

20A: Final QA Behavioral Questions (Part 1)

1

How do you handle pressure situations in testing?

Prioritize tasks based on impact, communicate risks early, stay calm, focus on critical areas first, and escalate when necessary.

2

How do you deal with developers who disagree on a bug?

Stick to facts — show reproducible steps, screenshots, logs, and refer to requirement documents to justify the defect objectively.

3

How do you upskill yourself in testing?

Regularly take online courses, attend webinars, practice coding challenges, read testing blogs, and experiment with new tools.

4

How do you ensure quality in Agile projects?

Participate early in grooming, review user stories critically, maintain strong regression suites, and integrate automation in sprints.

5

How do you ensure a bug is truly fixed?

Retest the defect scenario, perform exploratory testing around impacted areas, and validate against acceptance criteria.

20B: Final QA Behavioral Questions (Part 2)

1

How do you handle incomplete requirements?

Proactively seek clarifications from BA/PO, document assumptions, communicate risks, and collaborate closely with stakeholders.

2

How do you document your test results?

Maintain detailed test execution reports with pass/fail status, attach screenshots for failures, log defects, and summarize findings concisely.

3

How do you mentor junior testers?

Conduct code reviews, explain best practices, share learning resources, pair for exploratory sessions, and provide constructive feedback.

4

How do you contribute to process improvements?

Identify repetitive tasks for automation, suggest better tools, recommend smarter workflows, and share retrospective action items.

5

How do you approach testing when you have minimal documentation?

Use exploratory testing, leverage domain knowledge, ask clarifying questions, and create ad-hoc test scenarios on the fly.

20C: Final QA Behavioral Questions (Part 3)

1

How do you estimate automation effort?

Analyze complexity of test cases, identify reusable components, assess environment setup needs, and buffer for maintenance/debugging.

2

How do you plan test coverage?

Align coverage with requirements, prioritize high-risk areas, include positive and negative paths, and trace back to acceptance criteria.

3

What is your biggest strength as a QA?

Attention to detail, critical thinking, automation proficiency, proactive problem-solving, and effective communication across teams.

4

How do you handle deadlines in testing?

Focus on critical functionality first, manage scope carefully, escalate risks early, automate regression, and ensure continuous communication.

5

Why should we hire you for this QA Automation role?

I bring strong technical skills in Selenium, Java, TestNG, API Testing, Agile understanding, a passion for quality, and a collaborative mindset to enhance project success.