1. a) Gray box testing requires leverages the benefits of both black box and white box testing, wherein the tester needs to have very less knowledge of the system internals while designing tests based on interfaces and function specifications.

In white box testing the tester has complete knowledge of the source code while in gray box he has the documentation of every interface and function definition and this can be tested with scenarios, while in black box testing there will be zero knowledge of the internals and only the input and output are tested.

Gray box is perfect for web services because, because of its distributed nature which makes white box testing impossible while black box testing doesn’t cover much testing.

Gray box testing generates tests based on state based model and architecture diagrams of the web services.

b)

**User Interface Testing** : This is to test the end user interface to make sure all the information required is presented to the user in an understandable manner and to analyze the aesthetic appearance of the user interface.

**Content Testing**: To uncover errors that occur in the content that is presented to the user by the web application. This also includes syntactic and semantic mistakes in text and other media presented.

**Navigation Testing:** This testing makes sure that the end user is able to navigate to the required parts of the web application’s functionalities. Also to ensure that the various parts perform the appropriate tasks. Selenium can be used to find if the webapp takes you to the expected pages.

**Component Testing:** Component testing comprises of configuration testing, performance testing and security testing.

Config testing is to ensure that the web app behaves the same way on any configuration in the client side or server side or both. This involves OS compatibility or device, screen etc. Razor, Clear case atc are some tools that are widely used for config testing.

Security Testing tests the web application’s defense against attacks such as XSS, SQL injection, man in the middle attack etc.

Tools like sqlmap can be used for this but a simple parsing of input could solve the issue.

Performance testing is carried out to evaluate the load balancing, load handling and stress testing of the server and the web application to analyze how it reacts in various situations that could occur. This is done by subjecting the system to excess requests/ load and maximizing resource utility and measuring with time and accuracy.There are many tools like ganglia to measure performance.