**Lab Exercise 1- Implementing Perceivable Accessibility Features in a Web Page**

**Objective**

To understand and implement key WCAG 2.1 Perceivable guidelines through hands-on development with HTML and ARIA to make content accessible to users with visual and auditory impairments.

**Pre-requisites**

* Basic knowledge of HTML and CSS.
* Familiarity with assistive technologies like screen readers.
* Access to accessibility testing tools (e.g., NVDA, VoiceOver, WAVE, Lighthouse).

**Exercise Overview**

You will:

1. Add alternative text to non-text content.
2. Make a video/audio accessible using transcripts or captions.
3. Use semantic HTML and ARIA for adaptable content.
4. Apply correct color contrast and check with tools.

**Part 1: Text Alternatives (1.1.1)**

**Goal**

Ensure all images, icons, and graphical elements have appropriate alternative text.

**Steps**

1. Create a basic HTML page.
2. Add images with alt attributes.

<img src="logo.png" alt="Company logo: BlueTech Industries">

<img src="chart.png" alt="Bar chart showing sales increase from Jan to Mar">

**Explanation**

* alt provides a textual alternative for screen readers.
* Informative images should be described.
* Decorative images should use alt="".

**Test**

* Use a screen reader or browser’s accessibility inspector to verify that alt text is read aloud or appears in the accessibility tree.

**Part 2: Time-Based Media (1.2.x)**

**Goal**

Make multimedia content accessible with captions, transcripts, or audio descriptions.

**Steps**

1. Embed a video with captions.

<video controls>

<source src="intro.mp4" type="video/mp4">

<track src="intro-captions.vtt" kind="captions" srclang="en" label="English">

Your browser does not support the video tag.

</video>

1. Provide a transcript below the video.

<p><strong>Transcript:</strong> Welcome to BlueTech! In this video, we will explore our latest AI-based services...</p>

**Explanation**

* Captions help users with hearing impairments.
* Transcripts support both auditory and cognitive accessibility.
* Use .vtt files for proper caption formatting.

**Part 3: Adaptable Content (1.3.x)**

**Goal**

Use semantic structure and ARIA landmarks to enable content adaptation across devices and assistive tech.

**Steps**

1. Structure your HTML with semantic tags.

<header>

<h1>Welcome to BlueTech</h1>

</header>

<nav aria-label="Main menu">

<ul>

<li><a href="#services">Services</a></li>

<li><a href="#about">About Us</a></li>

</ul>

</nav>

<main>

<section id="services">

<h2>Our Services</h2>

<p>We offer cloud and AI services tailored for startups.</p>

</section>

</main>

**Explanation**

* Semantic HTML helps screen readers understand structure.
* ARIA roles (role="main", aria-label) guide users navigating via assistive tech.

**Test**

* Use a screen reader to verify sectioning and navigation.
* Use browser dev tools to inspect the accessibility tree.

**Part 4: Sufficient Contrast (1.4.3 & 1.4.11)**

**Goal**

Ensure all text and UI elements meet minimum color contrast requirements.

**Steps**

1. Apply good contrast styles.

body {

background-color: #ffffff;

color: #222222; /\* High contrast \*/

}

.button {

background-color: #005A9C; /\* Blue \*/

color: #ffffff; /\* White text \*/

border: none;

padding: 10px 15px;

}

1. Use a contrast checker tool (e.g., WebAIM, Axe) to verify:
   * **Text contrast**: Minimum 4.5:1
   * **UI elements (buttons, focus outlines)**: Minimum 3:1

**Explanation**

* 1.4.3 (Text Contrast): Ensures readability for users with visual impairments.
* 1.4.11 (Non-text Contrast): Ensures buttons, icons, and indicators are visible.

**Accessibility Testing Tips**

* Use **NVDA** (Windows) or **VoiceOver** (macOS) to simulate screen reader experience.
* Validate structure and ARIA roles using browser developer tools.
* Run **WAVE** or **Lighthouse** to catch automated contrast and semantic issues.

**Use Case Scenario**

**Use Case**: A government services portal needs to be accessible to citizens including elderly users, users with low vision, and those who rely on screen readers.

**Implementation**:

* Alternative text for all visual icons.
* Transcripts for explainer videos.
* Proper heading hierarchy for navigation.
* Color contrast maintained for readability.

**Outcome**:

* Improved accessibility score.
* Compliant with Section 508 and WCAG 2.1 AA.
* Higher user satisfaction across demographics.