**Module 17)**

**Javascript For Full Stack Assignment**

1. **JavaScript Introduction**

**Theory Assignment**

* 1. What is JavaScript? Explain the role of JavaScript in web development.

JavaScript is a **High-Level** **Programming Language,** That is used to make web pages interactive and dynamic. It runs directly in the browser and work alongside HTML and CSS to create full-featured website. It can update and change both **HTML** and **CSS.** JavaScript can **calculate, manipulate and validate** data.

It was originally created to add small interactive featires to websites like image sliders, pop-up messages or form validation, but today it powers complex applications like Gmail, Facebook and YouTube.

**Role of JavaScript in Web Development:**

JavaScript plays an important key role in modern web development in the following ways:

1. **Interactivity:** Adds dynamic behavior to websites, such as:

* Dropdown menus
* Sliders or Carousels
* Real-time form validation
* Pop-up alerts, modals, etc.

1. **DOM Manipulation:**

* JavaScript can access and change the structure, content and style of a webpage using the Document Object Model (DOM).

**Ex.** Changing text, colors or hiding/showing elements when a user clicks a button.

1. **Client-Side Logic:**

* Runs directly in the browser without needing a server call.
* Speeds up user experience by responding immediately to user actions.

1. **Form Handling & validation:**

* Checks whether form inputs (like email or password) are valid before sending data to the server.

1. **Asynchronous Communication (AJAX):**

* Javascript can fetch data in the background from a server without reloading the page.

**Ex.** Loading new comments or search suggestions withoout refreshing.

1. **Event Handling:**

* Responds to user actions like clicks, key presses, mouse movement, etc.

1. **Integration with APIs:**

* JavaScript can call APIs (like weather data, Google Maps, etc.) and display the data on your website.

1. **Frameworks and Libraries:**

* **JavaScript has powerful tools like:**
* React, Angular, Vue (for building Uis)
* jQuery (for simple DOM manipulation)
* Node.js (to use JavaScript on the backend/server side)

In short, JavaScript brings life to websites, without it, web pages would just be static and not respond to user actions.

* 1. How is JavaScript different from other programming languages like Python or Java?

JavaScript, Python and Java are all powerful programming languages but they are used for different purposes and they have different designs. Here’s a clear comparison to help us to understand the key difference:

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature** | **JavaScript** | **Python** | **Java** |
| **Use** | Used for Web Development as frontend | General Purpose used for data, AI, etc. | General purpose as android apps |
| **Backend support** | Yes | Yes | Yes |
| **Execution environment** | Runs in web browsers, node.js (server) | Runs in python interpreter(desktop/server) | Runs in Java virtual machine known as JVM. |
| **Syntax style** | C-style(uses {} and ;) | Simple and clean  (uses indentation) | Strict, verbose  (require more code) |
| **Typing System** | Dynamic Typing  Let x=5; | Dynamic Typing  X=5 | Static Typing  Int x=5; |
| **Speed and performance** | It is fast for browsers and web use. | It is slower | It is fastest |
| **Industrial use** | Websites, SPAs, interactive Uis, APIs | AI, data science, automation, scripting | Android apps, enterprise software, banking apps |
| **Community & Ecosystem** | Huge ecosystem  (React, angular, Node.js) | Strong in Data Science, ML, automation (NumPy. Pandas) | Strong in enterprise, android, finance |

* 1. Discuss the use of <script> tag in HTML. How can you link an external JavaScript file to an HTML document?

The **<script>** tag in HTML is used to embed JavaScript code or link to external JavaScript files that allow you to add interactivity, logic and dynamic behaviour to a web page.

1. **Embedding JavaScript (Internal Script):**

We can write JavaScript code directly inside the HTML file using the **<script>** tag.

**Lab Assignment**

* 1. **Task**
* Create a simple HTML page and add a <script> tag within the page.
* Write JavaScript code to display an alert box with the message "Welcome to JavaScript!" when the page loads.

1. **Variables and Data Types**

**Theory Assignment**

* 1. What are variables in JavaScript? How do you declare a variable using var, let, and const?
  2. Explain the different data types in JavaScript. Provide examples for each.
  3. What is the difference between undefined and null in JavaScript?

**Lab Assignment**

* 1. **Task**
* Write a JavaScript program to declare variables for different data types (string, number, boolean, null, and undefined).
* Log the values of the variables and their types to the console using console.log().

1. **JavaScript Operators**

**Theory Assignment**

* 1. What are the different types of operators in JavaScript? Explain with examples.
* Arithmetic operators
* Assignment operators
* Comparison operators
* Logical operators
  1. What is the difference between == and === in JavaScript?

**Lab Assignment**

* 1. **Task**
* Create a JavaScript program to perform the following:
* Add, subtract, multiply, and divide two numbers using arithmetic operators.
* Use comparison operators to check if two numbers are equal and if one number is greater than the other.
* Use logical operators to check if both conditions (e.g., a > 10 and b < 5) are true.

1. **Control Flow (If-Else, Switch)**

**Theory Assignment**

* 1. What is control flow in JavaScript? Explain how if-else statements work with an example.
  2. Describe how switch statements work in JavaScript. When should you use a switch statement instead of if-else?

**Lab Assignment**

* 1. **Task**
* Write a JavaScript program to check if a number is positive, negative, or zero using an if-else statement.
  1. **Task**
* Create a JavaScript program using a switch statement to display the day of the week based on the user input (e.g., 1 for Monday, 2 for Tuesday, etc.).

1. **Loops (For, While, Do-While)**

**Theory Assignment**

* 1. Explain the different types of loops in JavaScript (for, while, do-while). Provide a basic example of each.
  2. What is the difference between a while loop and a do-while loop?

**Lab Assignment**

* 1. **Task**
* Write a JavaScript program using a for loop to print numbers from 1 to 10.
  1. **Task**
* Create a JavaScript program that uses a while loop to sum all even numbers between 1 and 20.

**5.5 Task**

* Write a do-while loop that continues to ask the user for input until they enter a number greater than 10.

1. **Functions**

**Theory Assignment**

* 1. What are functions in JavaScript? Explain the syntax for declaring and calling a function.
  2. What is the difference between a function declaration and a function expression?
  3. Discuss the concept of parameters and return values in functions.

**Lab Assignment**

* 1. **Task**
* Write a function greetUser that accepts a user’s name as a parameter and displays a greeting message (e.g., "Hello, John!").
  1. **Task**
* Create a JavaScript function calculateSum that takes two numbers as parameters, adds them, and returns the result.

1. **Arrays**

**Theory Assignment**

* 1. What is an array in JavaScript? How do you declare and initialize an array?
  2. Explain the methods push(), pop(), shift(), and unshift() used in arrays.

**Lab Assignment**

* 1. **Task**
* Declare an array of fruits (["apple", "banana", "cherry"]). Use JavaScript to:
* Add a fruit to the end of the array.
* Remove the first fruit from the array.
* Log the modified array to the console.

**7.4 Task**

* Write a program to find the sum of all elements in an array of numbers.

1. **Objects**

**Theory Assignment**

* 1. What is an object in JavaScript? How are objects different from arrays?
  2. Explain how to access and update object properties using dot notation and bracket notation.

**Lab Assignment**

* 1. **Task**
* Create a JavaScript object car with properties brand, model, and year. Use JavaScript to:
* Access and print the car’s brand and model.
* Update the year property.
* Add a new property color to the car object.

1. **JavaScript Events**

**Theory Assignment**

* 1. What are JavaScript events? Explain the role of event listeners.
  2. How does the addEventListener() method work in JavaScript? Provide an example.

**Lab Assignment**

* 1. **Task**
* Create a simple webpage with a button that, when clicked, displays an alert saying "Button clicked!" using JavaScript event listeners.

1. **DOM Manipulation**

**Theory Assignment**

* 1. What is the DOM (Document Object Model) in JavaScript? How does JavaScript interact with the DOM?
  2. Explain the methods getElementById(), getElementsByClassName(), and querySelector() used to select elements from the DOM.

**Lab Assignment**

* 1. **Task**
* Create an HTML page with a paragraph (<p>) that displays "Hello, World!".
* Use JavaScript to:
* Change the text inside the paragraph to "JavaScript is fun!".
* Change the color of the paragraph to blue.

1. **JavaScript Timing Events (setTimeout, setInterval)**

**Theory Assignment**

* 1. Explain the setTimeout() and setInterval() functions in JavaScript. How are they used for timing events?
  2. Provide an example of how to use setTimeout() to delay an action by 2 seconds.

**Lab Assignment**

* 1. **Task**
* Write a program that changes the background color of a webpage after 5 seconds using setTimeout().
  1. **Task**
* Create a digital clock that updates every second using setInterval().

1. **JavaScript Err6r Handling**

**Theory Assignment**

* 1. What is error handling in JavaScript? Explain the try, catch, and finally blocks with an example.
  2. Why is error handling important in JavaScript applications?

**Lab Assignment**

* 1. **Task**
* Write a JavaScript program that attempts to divide a number by zero. Use try catch to handle the error and display an appropriate error message.