Tutorial No. 08

Title: DOM Manipulation and Advanced JavaScript Functions.

Batch: A1 Roll No.: 16010422013 Tutorial:8

Aim: To implement javascript methods, functions and Event Handling to manipulate DOM

Resources needed: Notepad++, Web Browser

Theory:

JavaScript is a scripting language produced by Netscape for use within HTML Web pages. JavaScript is loosely based on Java and it is built into all the major modern browsers. JavaScript is a lightweight, interpreted programming language, Complementary to and integrated with Java, Complementary to and integrated with HTML, Open and cross-platform and is case sensitive.

Placing JavaScript in HTML document:

There is a flexibility given to include JavaScript code anywhere in an HTML document. But there are the following most preferred ways to include JavaScript in your HTML file:

1. Script in <head>...</head> section.
2. Script in <body>...</body> section.
3. Script in <body>...</body> and <head>...</head> sections.
4. Script in and external file and then include in <head>...</head> section.

An example of it is shown below:

```
<html>
<body>
<script language="javascript" type="text/javascript">
<!--
document.write("Hello World!")
//-->
</script>
</body>
</html>
```

Looping and Control statements in JavaScript:

- if statement syntax:

```
if (expression){
  Statement(s) to be executed if expression is true
}
```

- if else statement syntax:

```
if (expression){
   Statement(s) to be executed if expression is true
}else{
   Statement(s) to be executed if expression is false
}
```

- else if ladder syntax:

```
 if (expression 1){
    Statement(s) to be executed if expression 1 is true
 }else if (expression 2){
    Statement(s) to be executed if expression 2 is true
 }else if (expression 3){
    Statement(s) to be executed if expression 3 is true
 }else{
    Statement(s) to be executed if no expression is true
 }
```

- switch statement syntax:

```
 switch (expression)
 {
   case condition 1: statement(s)
                     break;
   case condition 2: statement(s)
                     break;
    ...
   case condition n: statement(s)
                     break;
   default: statement(s)
 }
```

- While Loop

```
  while (expression){
     Statement(s) to be executed if expression is true
  }
```

- do- while Loop

```
do{
    Statement(s) to be executed;
 } while (expression);
```

- for Loop

```
for(initialization; test condition; iteration statement){
Statement(s) to be executed if test condition is true
}

 for (variablename in object){
   Statement or block to execute
 }
```

Syntax for JavaScript functions:

```
function concatenate(first, last)
{
  var full;
  full = first + last;
  return full;
}
```

To invoke a function somewhere later in the script, you would simple need to write the name of that function.

Javascript Dialog boxes:

JavaScript supports three important types of dialog boxes. These dialog boxes can be used to raise and alert, or to get confirmation on any input or to have a kind of input from the users:

- Alert Dialog Box:
  An alert dialog box is mostly used to give a warning message to the users.
  ```
  alert("Warning Message");
  ```

- Confirmation Dialog Box:
  A confirmation dialog box is mostly used to take user's consent on any option. It displays a dialog box with two buttons: OK and Cancel.
  ```
  var retVal = confirm("Do you want to continue ?");
  ```
- Prompt Dialog Box:
  The prompt dialog box is very useful when you want to pop-up a text box to get user input. Thus it enables you to interact with the user. The user needs to fill in the field and then click OK.

  ```
  var retVal = prompt("Enter your name : ", "your name here");
  ```

In built objects in JavaScript:

A String object encapsulates a sequence of characters, enclosed in quotes

properties include :

- length : stores the number of characters in the string
- charAt(index) : returns the character stored at the given index (as in indices start at 0)
- substring(start, end) : returns the part of the string between the start (inclusive) and end (exclusive) indices
- toUpperCase() : returns copy of string with letters uppercase
- toLowerCase() : returns copy of string with letters lowercase

Arrays store a sequence of items, accessible via an index since JavaScript is loosely typed, elements do not have to be the same type. To create an array, allocate space using new (or can assign directly):

```
items = new Array(10);          // allocates space for 10 items
items = new Array();            // if no size given, will adjust dynamically
items = [0,0,0,0,0,0,0,0,0,0]; // can assign size & values []
```

To access an array element, use [] (as in C++/Java)

```
for (i = 0; i < 10; i++) {
    items[i] = 0;           // stores 0 at each index
}
```

The length property stores the number of items in the array.

The Date object can be used to access the date and time. To create a Date object, use new & supply year/month/day/… as desired

```
today = new Date();         // sets to current date & time
newYear = new Date(2002,0,1); //sets to Jan 1, 2002 12:00AM
```

Methods can access individual components of a date includes:

```
newYear.getYear()

newYear.getMonth()
newYear.getDay()
newYear.getHours()
newYear.getMinutes()
newYear.getSeconds()
newYear.getMilliseconds()
```

Document Object Model(DOM):

DOM Objects can be referenced using JavaScript

- by their id or name (this is the easiest way, but you need to make sure a name is unique in the hierarchy)

- by their numerical position in the hierarchy, by walking the array that contains them
- by their relation to parent, child, or sibling (parentNode, previousSibling, nextSibling, firstChild, lastChild or the childNodes

JavaScript and DOM:

JavaScript is used to manipulate the objects. For this id of an element is needed to be passed to method getElementById() of document object, which returns the element with the given id. And then we can alter its property.

For example,
if you want to find a <p> with the id of "cool", use:

```
getElementById("cool")
document.getElementById(item).style.backgroundColor =color;
```

to access the elements nested in <p> tag we can use,

```
document.getElementById(item).childNodes[1].style.backgroundColor =color;
```

Document Object:

innerHTML is a property of any document element that contains all of the html source and text within that element.

```
getElementById("cool").innerHTML ="new text string";
```

Methods:

document.write(…) : method that displays text in the page

document.URL : property that gives the location of the HTML document

document.lastModified :property that gives the date & time the HTML document was last changed

Activity:

1. Explore different methods of in-built JavaScript objects date, string, math, array etc.
2. Include at least two significant methods of some of these objects in your script
3. Extract elements of document using DOM and manipulate same using methods

Results: (Program printout with output)

Multiplication Task:

index1.html:

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<title>Multiplication Task</title>
</head>
<body>

<h2>Multiplication Form</h2>

<form id="multiplicationForm">
    <label for="num1">Enter the first number:</label>
    <input type="number" id="num1" name="num1" required><br><br>
    <label for="num2">Enter the second number:</label>
    <input type="number" id="num2" name="num2" required><br><br>
    <button type="submit">Multiply</button>
</form>

<div id="result"></div>

<script>
    function multiply(a) {
        return function(b)
        { return a * b;
        };
    }
    document.getElementById("multiplicationForm").addEventListener("submit",
function(event)
    {
        event.preventDefault();
        const num1 = parseFloat(document.getElementById("num1").value);
        const num2 = parseFloat(document.getElementById("num2").value);
        const multiplyResult = multiply(num1)(num2);
        document.getElementById("result").innerText = `The result of
multiplying ${num1} and
        ${num2} is: ${multiplyResult}`;
    });
</script>

</body>
</html>
```

DOM Task:

index2.html:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Quiz App</title>
  <style>
    body {
      font-family: Arial, sans-serif;
      text-align: center;
      background-color: #f0f0f0;
    }

    .container {
      max-width: 600px;
      margin: 50px auto;
      padding: 20px;
      background-color: white;
      border-radius: 10px;
      box-shadow: 0 0 10px rgba(0, 0, 0, 0.1);
    }

    h1 {
      margin-bottom: 30px;
    }

    .question {
      margin-bottom: 30px;
      text-align: left;
    }

    .question h3 {
      margin-bottom: 10px;
    }

    .option {
      display: block;
      margin-bottom: 10px;
      cursor: pointer;
    }

    .option input {
      margin-right: 10px;
    }

    #submit-btn {
      background-color: #4CAF50;
      color: white;
      border: none;
```

```
      padding: 10px 20px;
      border-radius: 5px;
      cursor: pointer;
      margin-top: 20px;
    }

    #result-container {
      margin-top: 30px;
    }

    table {
      width: 100%;
      border-collapse: collapse;
      margin-top: 20px;
    }

    th, td {
      padding: 10px;
      text-align: left;
      border-bottom: 1px solid #ddd;
    }

    th {
      background-color: #f2f2f2;
    }
  </style>
</head>
<body>
  <div class="container">
    <h1>Quiz App</h1>
    <div id="quiz-container">
      <div class="question">
        <h3>1. What is the capital of France?</h3>
        <label class="option">
          <input type="radio" name="question-0" value="0">
          London
        </label>
        <label class="option">
          <input type="radio" name="question-0" value="1">
          Paris
        </label>
        <label class="option">
          <input type="radio" name="question-0" value="2">
          Berlin
        </label>
        <label class="option">
          <input type="radio" name="question-0" value="3">
          Rome
        </label>
      </div>
      <div class="question">
        <h3>2. Which planet is known as the 'Red Planet'?</h3>
```

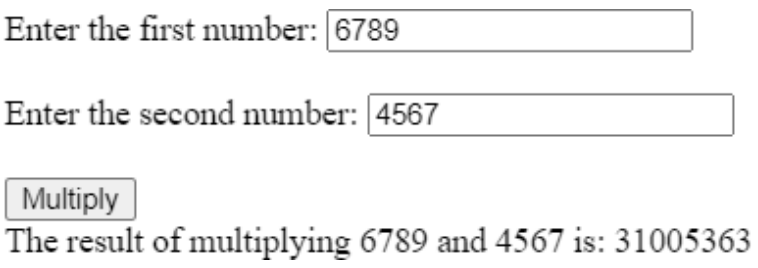
```
      <label class="option">
        <input type="radio" name="question-1" value="0">
        Venus
      </label>
      <label class="option">
        <input type="radio" name="question-1" value="1">
        Jupiter
      </label>
      <label class="option">
        <input type="radio" name="question-1" value="2">
        Mars
      </label>
      <label class="option">
        <input type="radio" name="question-1" value="3">
        Saturn
      </label>
    </div>
    <div class="question">
      <h3>3. What is the largest ocean on Earth?</h3>
      <label class="option">
        <input type="radio" name="question-2" value="0">
        Pacific Ocean
      </label>
      <label class="option">
        <input type="radio" name="question-2" value="1">
        Atlantic Ocean
      </label>
      <label class="option">
        <input type="radio" name="question-2" value="2">
        Indian Ocean
      </label>
      <label class="option">
        <input type="radio" name="question-2" value="3">
        Arctic Ocean
      </label>
    </div>
    <div class="question">
      <h3>4. Who invented the telephone?</h3>
      <label class="option">
        <input type="radio" name="question-3" value="0">
        Thomas Edison
      </label>
      <label class="option">
        <input type="radio" name="question-3" value="1">
        Alexander Graham Bell
      </label>
      <label class="option">
        <input type="radio" name="question-3" value="2">
        Nikola Tesla
      </label>
      <label class="option">
        <input type="radio" name="question-3" value="3">
```

```
        Benjamin Franklin
      </label>
    </div>
    <div class="question">
      <h3>5. What is the smallest country in the world by land area?</h3>
      <label class="option">
        <input type="radio" name="question-4" value="0">
        Monaco
      </label>
      <label class="option">
        <input type="radio" name="question-4" value="1">
        Vatican City
      </label>
      <label class="option">
        <input type="radio" name="question-4" value="2">
        Nauru
      </label>
      <label class="option">
        <input type="radio" name="question-4" value="3">
        Tuvalu
      </label>
    </div>
  </div>
  <button id="submit-btn">Submit</button>
  <div id="result-container">
    <h2>Your Score:</h2>
    <p id="score"></p>
    <h2>Correct and Incorrect Answers:</h2>
    <table id="result-table">
      <thead>
        <tr>
          <th>Question</th>
          <th>Your Answer</th>
          <th>Correct Answer</th>
          <th>Result</th>
        </tr>
      </thead>
      <tbody>
      </tbody>
    </table>
  </div>
</div>

<script>
  const quizData = [
    {
      question: "What is the capital of France?",
      options: ["London", "Paris", "Berlin", "Rome"],
      answer: 1
    },
```

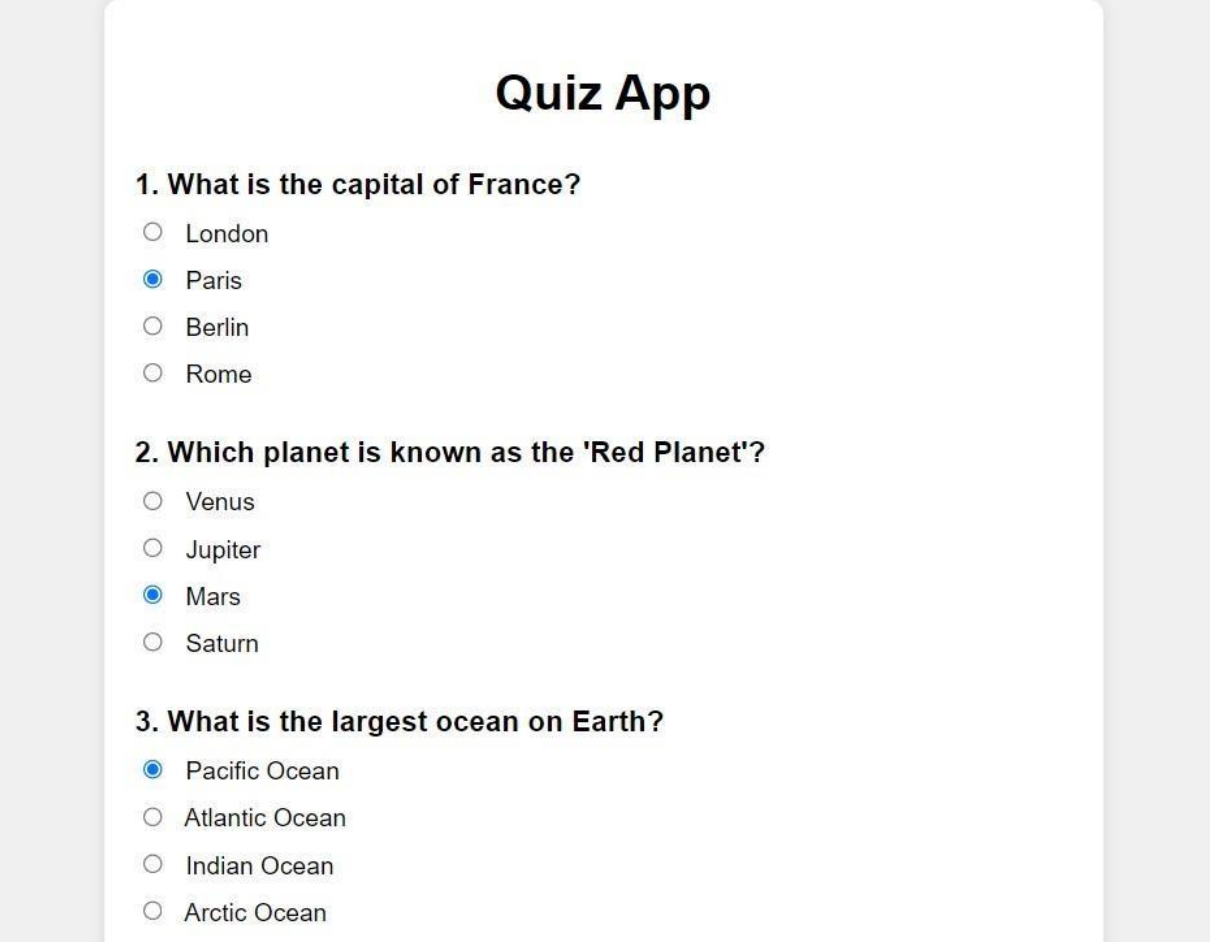
```
      {
        question: "Which planet is known as the 'Red Planet'?",
        options: ["Venus", "Jupiter", "Mars", "Saturn"],
        answer: 2
      },
      {
        question: "What is the largest ocean on Earth?",
        options: ["Pacific Ocean", "Atlantic Ocean", "Indian Ocean", "Arctic
Ocean"],
        answer: 0
      },
      {
        question: "Who invented the telephone?",
        options: ["Thomas Edison", "Alexander Graham Bell", "Nikola Tesla",
"Benjamin Franklin"],
        answer: 1
      },
      {
        question: "What is the smallest country in the world by land area?",
        options: ["Monaco", "Vatican City", "Nauru", "Tuvalu"],
        answer: 1
      }
    ];

    const quizContainer = document.getElementById("quiz-container");
    const submitBtn = document.getElementById("submit-btn");
    const scoreDisplay = document.getElementById("score");
    const resultTable = document.getElementById("result-
table").getElementsByTagName("tbody")[0];

    function displayResults() {
      let totalScore  =  0;
      const results = [];

      quizData.forEach((question, index) => {
        const selectedOption = document.querySelector(`input[name="question-
${index}"]:checked`);
        const selectedAnswer = selectedOption ? parseInt(selectedOption.value)
: -1;
        const isCorrect = selectedAnswer === question.answer;

        if (isCorrect) {
          totalScore += 1;
        }

        results.push({
          question: question.question,
          userAnswer: selectedAnswer !== -1 ? question.options[selectedAnswer]
: "Not Answered",
          correctAnswer: question.options[question.answer],
          result: isCorrect ? "Correct" : "Incorrect"
        });
```

```
      });

      scoreDisplay.textContent = `${totalScore}/${quizData.length}`;

      results.forEach(result => {
        const row = document.createElement("tr");

        const questionCell = document.createElement("td");
        questionCell.textContent = result.question;
        row.appendChild(questionCell);

        const userAnswerCell = document.createElement("td");
        userAnswerCell.textContent = result.userAnswer;
        row.appendChild(userAnswerCell);

        const correctAnswerCell = document.createElement("td");
        correctAnswerCell.textContent = result.correctAnswer;
        row.appendChild(correctAnswerCell);

        const resultCell = document.createElement("td");
        resultCell.textContent = result.result;
        resultCell.style.color = result.result === "Correct" ? "green" : "red";
        row.appendChild(resultCell);

        resultTable.appendChild(row);
      });

      const score = (totalScore / quizData.length) * 100;
      if (score >= 65) {
        alert("Congratulations! You passed the quiz.");
      } else {
        alert("You didn't pass the quiz. Please try again.");
      }
    }

    submitBtn.addEventListener("click", displayResults);
  </script>
</body>
</html>
```

Result (Multiplication):



Result (DOM):


Quiz App
1. What is the capital of France?
London
Paris
Berlin
Rome
2. Which planet is known as the 'Red Planet'?
Venus
Jupiter
Mars
Saturn
3. What is the largest ocean on Earth?
Pacific Ocean
Atlantic Ocean
Indian Ocean
Arctic Ocean

4. Who invented the telephone?

- ○ Thomas Edison
- ◉ Alexander Graham Bell
- ○ Nikola Tesla
- ○ Benjamin Franklin

5. What is the smallest country in the world by land area?

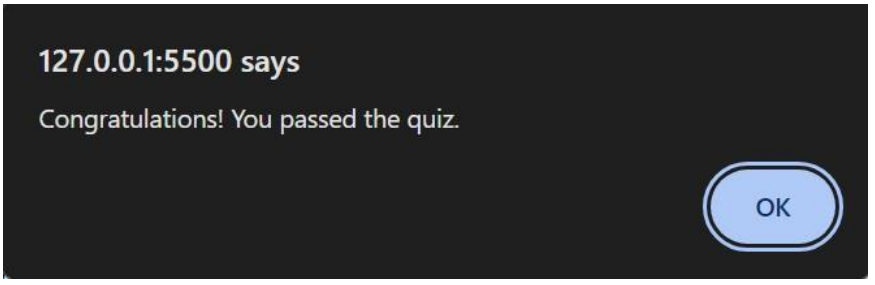
- ○ Monaco
- ◉ Vatican City
- ○ Nauru
- ○ Tuvalu

Submit

Your Score:

Correct and Incorrect Answers:

Question	Your Answer	Correct Answer	Result

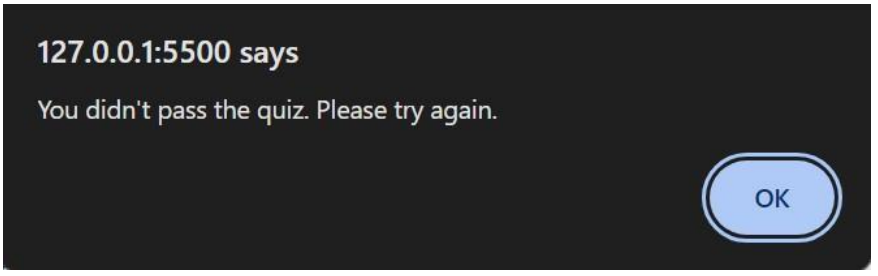


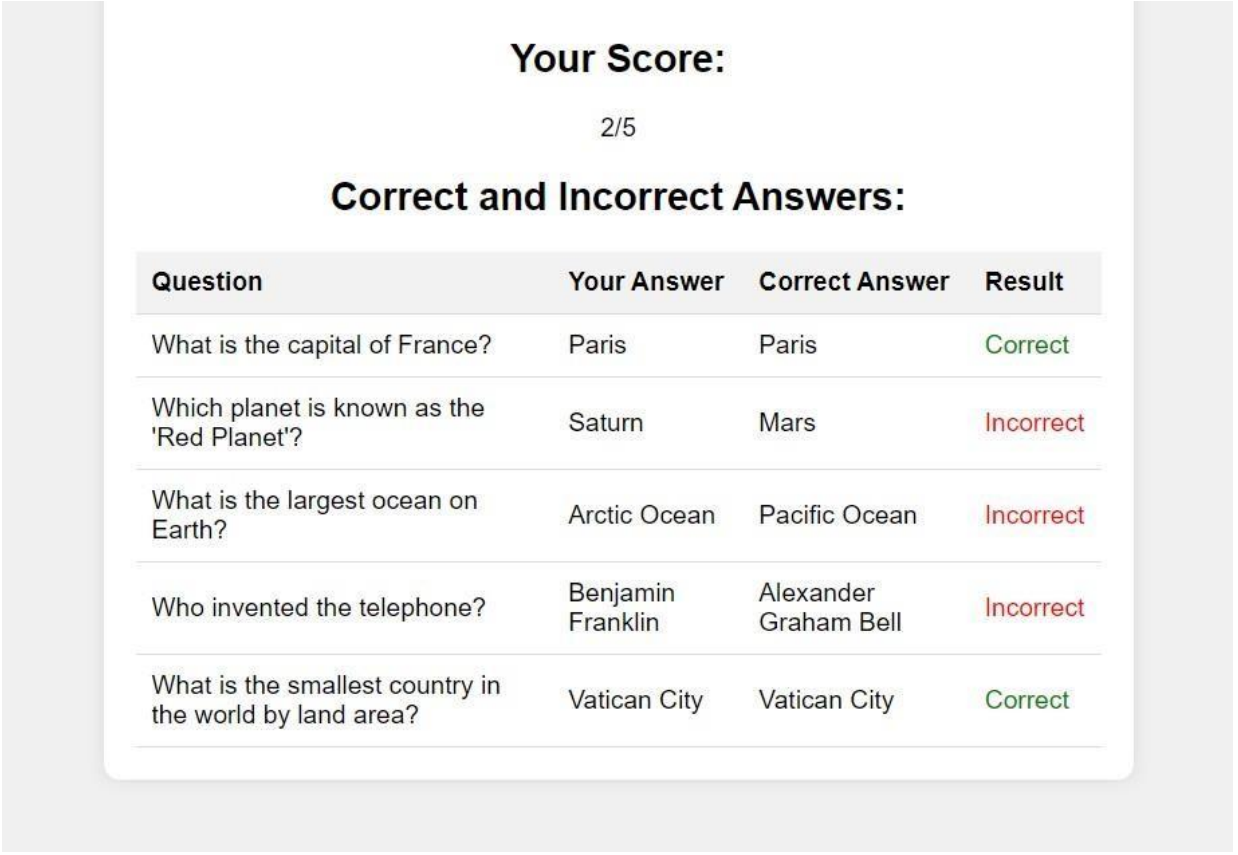
Your Score:

5/5

Correct and Incorrect Answers:

Question	Your Answer	Correct Answer	Result
What is the capital of France?	Paris	Paris	Correct
Which planet is known as the 'Red Planet'?	Mars	Mars	Correct
What is the largest ocean on Earth?	Pacific Ocean	Pacific Ocean	Correct
Who invented the telephone?	Alexander Graham Bell	Alexander Graham Bell	Correct
What is the smallest country in the world by land area?	Vatican City	Vatican City	Correct





Your Score:

2/5

Correct and Incorrect Answers:

Question	Your Answer	Correct Answer	Result
What is the capital of France?	Paris	Paris	Correct
Which planet is known as the 'Red Planet'?	Saturn	Mars	Incorrect
What is the largest ocean on Earth?	Arctic Ocean	Pacific Ocean	Incorrect
Who invented the telephone?	Benjamin Franklin	Alexander Graham Bell	Incorrect
What is the smallest country in the world by land area?	Vatican City	Vatican City	Correct

Questions:

Q1) Explain with examples on how Javascripts help in creating dynamic HTML page.

Ans. JavaScript is a powerful programming language that plays a crucial role in creating dynamic HTML pages. Some examples of how JavaScript can be used to enhance the interactivity and functionality of web pages:

Document Object Model (DOM) Manipulation: JavaScript allows you to access and manipulate the structure, content, and style of an HTML document using the DOM. This enables you to dynamically create, modify, and remove HTML elements, attributes, and text content. We can use JavaScript to:
Change the content of an HTML element (e.g., document.getElementById("myElement").innerHTML = "New content";).

Event Handling: JavaScript allows you to respond to user actions, such as clicks, mouse movements, form submissions, and key presses, by registering event listeners. This enables you to create interactive user interfaces and dynamic behaviors. We can use JavaScript to:
Add a click event listener to a button and display a message when the button is clicked (e.g., button.addEventListener("click", function() { alert("Button clicked!"); });).
Validate form input and display error messages before the form is submitted (e.g., form.addEventListener("submit", function(event) { event.preventDefault(); if (inputField.value === "") { displayError("Please enter a value."); } else { form.submit(); } });).

AJAX (Asynchronous JavaScript and XML): JavaScript, combined with technologies like XMLHttpRequest or the Fetch API, enables you to make asynchronous HTTP requests to the server and dynamically update the web page without requiring a full-page refresh. This allows for smooth and responsive user experiences. We can use AJAX to: Load and display data from a server without reloading the entire page (e.g., fetch("/data.json").then(response => response.json()).then(data => displayData(data));). Submit form data to the server and update the page with the response (e.g., form.addEventListener("submit", function(event) { event.preventDefault(); fetch("/submit-form", { method: "POST", body: new FormData(form) }).then(response => response.text()).then(message => displayMessage(message)); });).

Animation and Interactivity: JavaScript can be used to create animations, transitions, and interactive effects on web pages. This includes features like sliding menus, fading elements, carousel sliders, and hover effects. For example, you can use JavaScript to: Create a simple animation by modifying the CSS properties of an element over time (e.g., let element = document.getElementById("myElement"); element.style.transform = "translateX(100px)"; element.style.transition = "transform 1s ease-in-out";). Implement a carousel slider by dynamically updating the visibility and position of slide elements (e.g., let currentSlide = 0; function showSlide(n) { /* code to show the nth slide */ }; setInterval(function() { showSlide(++currentSlide); }, 5000);).

Q2) What is DOM? Explain.

Ans. DOM stands for the ***Document Object Model***. It is a programming interface for web documents that represents the structure of an HTML or XML document as a tree-like hierarchy of nodes.

The DOM allows programs and scripts to dynamically access and update the content, structure, and style of a web page. It provides a way for programming languages, such as JavaScript, to interact with the elements on a web page.

Document Structure: The DOM represents the web page as a tree-like structure, where each HTML element, attribute, and text content is a node in the tree. The top-level node is the document object, which represents the entire web page.

Tree-like Hierarchy: The DOM organizes the web page elements in a hierarchical structure. For example, the <body> element is a child of the <html> element, and the <h1> and <p> elements are children of the <body> element.

Access and Manipulation: The DOM provides methods and properties that allow you to access and manipulate the elements of the web page. This includes selecting elements, modifying their content and attributes, creating new elements, and removing existing ones.

Dynamic Updates: The DOM is dynamic, meaning that the structure and content of the web page can be updated in real-time through programming. This allows for the creation of interactive and responsive web applications.

The DOM is a fundamental part of web development, as it allows developers to create dynamic and interactive web pages by programmatically manipulating the structure and content of the document.

Outcomes:
CO3: Apply JavaScript and JSON for web application development

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Conclusion: (Conclusion to be based on the outcomes achieved)

Learnt how to implement JavaScript methods, functions and Event Handling to manipulate DOM.

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of faculty in-charge with date

References:

Books/ Journals/ Websites:

- "Web technologies: Black Book", Dreamtech Publications
- http://www.w3schools.com