Lab Manual: Full Stack Development Lab

[FSDL – 2021-25]

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Vision of Institute

To be a center of excellence for creation and dissemination of knowledge by imparting life skills and experiential learning for a promising future in the areas of engineering and technology.

Mission of Institute

- To promote professional ethics and experiential learning for better employability.
- To contribute towards knowledge generation and dissemination in the field of engineering.
- To address societal problems by promoting research, innovation and entrepreneurship.
- To develop global competencies amongst students by fostering value-based education.
- To strengthen industrial, Institutional, and international collaborations for synergetic relations.

Vision of Department

To impart quality education with research insights for developing competent global engineers in the field of Artificial Intelligence and Machine Learning to solve societal problems.

Mission of Department

- To educate students on cutting-edge AIML technologies with strong industry connections to develop problem-solving capabilities, leadership, and teamwork skills.
- To produce quality research through national and international collaborations leading to publications, IPR, and sponsored/funded projects.
- To inculcate professional values with lifelong learning through curricular and co-curricular activities and create globally-aware citizens.

PROGRAM OUTCOMES (PO):

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

1. To apply the concepts of Artificial Intelligence and Machine Learning with practical knowledge in analysis, design and development of intelligent systems and applications to multi-disciplinary problems
2. To provide a concrete foundation to the students in the cutting edge areas Artificial Intelligence and Machine Learning and excelling in the specialized areas like Natural Language Processing, Computer Vision, Reinforcement Learning, Internet of Things, Cloud computing, Data Security and privacy etc.

GENERAL LABORATORY INSTRUCTIONS

1) Students are advised to come to the laboratory at least 5 minutes before (to the starting time), those who come after 5 minutes will not be allowed into the lab.

2) Plan your task properly much before to the commencement, come prepared to the lab with the program / experiment details.

3) Student should enter into the laboratory with:

   a. Laboratory Record updated up to the last session experiments.

   b. Proper Dress code and Identity card.

4) Execute your task in the laboratory, and record the results / output in the lab observation note book, and get certified by the concerned faculty.

5) All the students should be polite and cooperative with the laboratory staff, must maintain the discipline and decency in the laboratory.

6) Computer labs are established with sophisticated and high end branded systems, which should be utilized properly.

7) Students / Faculty must keep their mobile phones in SWITCHED OFF mode during the lab sessions. Misuse of the equipment, misbehaviours with the staff and systems etc., will attract severe punishment.

8) Students must take the permission of the faculty in case of any urgency to go out; if anybody found loitering outside the lab / class without permission during working hours will be treated seriously and punished appropriately.

9) Students should LOG OFF/ SHUT DOWN the computer system before he/she leaves the lab after completing the task (experiment) in all aspects. He/she must ensure the system / seat is kept properly.

Lab Duration: 30 hours

Lab Objectives

1. To construct basic websites using HTML and Cascading Style Sheets.
2. To build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
3. To develop modern interactive web applications using advanced web and database technologies.

Lab Outcome

CO 1-Web Design Proficiency: Students will acquire the ability to design responsive webpages with a registration form using HTML and CSS, demonstrating an understanding of fundamental design principles and layout techniques.

CO 2-CSS Styling Mastery: students will showcase proficiency in applying various CSS styles and layouts, allowing them to create visually appealing and well-styled web pages.

CO 3-Bootstrap Implementation Skills: Through the card-flip effect task, students will gain hands-on experience in implementing Bootstrap components, enhancing their skills in leveraging popular front-end frameworks for creating dynamic and engaging user interfaces.

CO 4-JavaScript Interactivity: Students will be able to use JavaScript to add interactivity to web pages, including the implementation of pop-up boxes (alert, confirm, prompt) and event handling on form elements, thereby enhancing the user experience and functionality of their web applications.

CO 5-React.js and Node.js Competence: By building interactive interfaces with React components, implementing routing in React JS, and developing a web application with Node.js for NO SQL database interaction, students will achieve proficiency in modern web development technologies. They will be capable of creating dynamic and scalable web applications using these popular frameworks and libraries.

Lab Equipment and Software:

1) Computers with the required programming environment (e.g., Text Editor, Google Chrome, Node.js, React.js, MongoDB, Node Package Manager).
2) Integrated Development Environment (IDE) such as Visual Studio Code, Eclipse, or Code, Blocks, DEV C++. (Recommended DEV C++)
3) Sample input/output files for testing purposes.

Lab Activities:

Experiment 1: Design a Webpage for Registration Form

Experiment 2: Design a responsive webpage for a registration form using HTML and CSS.

Experiment 3: Implement a card-flip effect using Bootstrap.

Experiment 4: Use JavaScript to display pop up boxes alert box, an alert box with line breaks, confirm box, prompt box

Experiment 5: Create a registration form and demonstrate the event handling on form elements.

Experiment 6: Use React components to build interactive interfaces.

Experiment 7: Implement routing in React JS.

Experiment 8: Create a database from .json file and execute NO SQL Queries.

Experiment 9: Write a web application with Node.js to insert a document/record in NO SQL document based database collection.

Lab Report:

- Each student should submit a lab report documenting their implementation, including code snippets and output screenshots.
- The report should include a description of the implemented algorithms.
- Students should provide a detailed explanation of the testing performed and the results obtained.
- The report should also include any challenges faced during the lab and their solutions.

Lab Evaluation:

- **Students will be evaluated based on their implementation of the required algorithms.**
- **The correctness and efficiency of the implemented solutions will be assessed.**
- **The quality and completeness of the lab report will also be considered for evaluation.**

Assessment	Marks	Total
Continuous Assessment (CA)	10	25
End Sem Exam (ESE)	15	

Continuous Assessment (CA):

Each Lab will be evaluated based on following Rubrics. Finally, all the marks should be scale down to maximum 10 only.

Lab Performance for each experiment				Viva	Total
Timely Lab report Submission	Correctness of Code	Code Quality	Testing and Validation	Based on the Experiment Performed	
2	6	4	2	6	20

Timely Lab Report Submission (10%): If a student fails to submit the handwritten report by the specified due date, a penalty will be imposed. The marks for report submission will decrease by 1 marks if submitted within next five days, and after 5 days you will get 0 marks. However, it is still mandatory for the student to submit the report, as it is crucial for claiming other marks allocated to the laboratory. Failure to submit the report will result in a total score of 0 for the entire lab. In addition to the handwritten notes, students are required to submit a single PDF copy containing the executable code, description, and output screen to the designated Google Classroom shortly after the experiment concludes. **Note: It is compulsory for you to add your name and PRN in the top left corner of each page of the report. Additionally, please be aware that in case of plagiarized code, no marks will be awarded.**

Correctness of Code (30%): Marks will be awarded based on

- Implements required algorithm correctly.
- Handles edge cases (e.g., empty array, target not found) appropriately.
- Returns the correct value or output as required

Code Quality (20%):

- Follows proper coding conventions (e.g., indentation, variable naming).
- Uses appropriate data types and memory management.
- Includes comments for better code understanding.
- Avoids code redundancy and follows good programming practices.

Testing and Validation (10%):

- Tests the program with various test cases, including edge cases.
- Produces correct output for all test cases.

Viva (30%): Based on the Experiment performed.

End Sem Exam (ESE): To be evaluated at the end of semester

Lab Performance				Viva	Total
Timely Completion of Code with write Up	Correctness of Code	Code Quality	Testing and Validation	Based on the Experiment Performed	
2	3	3	2	5	30

Experiment 1

What is HTML?

- HTML stands for Hyper Text Markup Language
- HTML is the standard markup language for creating Web pages
- HTML describes the structure of a Web page
- HTML consists of a series of elements
- HTML elements tell the browser how to display the content
- HTML elements label pieces of content such as "this is a heading", "this is a paragraph", "this is a link", etc.

A Simple HTML Document

`<!DOCTYPE html>`
`<html>`
`<head>`
`<title>`Page Title`</title>`
`</head>`
`<body>`
 	
`<h1>`My First Heading`</h1>`
`<p>`My first paragraph.`</p>`
 	
`</body>`
`</html>`
	• The `<!DOCTYPE html>` declaration defines that this document is an HTML5 document
	• The `<html>` element is the root element of an HTML page
	• The `<head>` element contains meta information about the HTML page
	• The `<title>` element specifies a title for the HTML page (which is shown in the browser's title bar or in the page's tab)
	• The `<body>` element defines the document's body, and is a container for all the visible contents, such as headings, paragraphs, images, hyperlinks, tables, lists, etc.
	• The `<h1>` element defines a large heading
	• The `<p>` element defines a paragraph

What is an HTML Element?

An HTML element is defined by a start tag, some content, and an end tag:

<tagname> Content goes here... </tagname>

The HTML element is everything from the start tag to the end tag:

<h1>My First Heading</h1>

<p>My first paragraph.</p>

Start tag	Element content	End tag
`<h1>`	My First Heading	`</h1>`
`<p>`	My first paragraph.	`</p>`
` `	*none*	*none*

Web Browsers

The purpose of a web browser (Chrome, Edge, Firefox, Safari) is to read HTML documents and display them correctly.

A browser does not display the HTML tags, but uses them to determine how to display the document:

HTML Page Structure

Below is a visualization of an HTML page structure:

Steps to Write Code and View on Web Browser

Step 1: Open Notepad (PC)
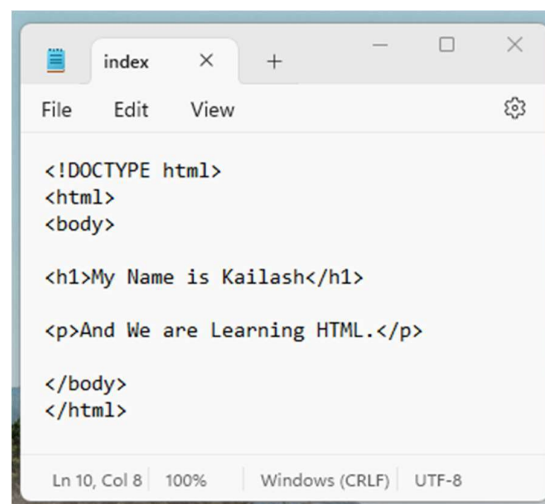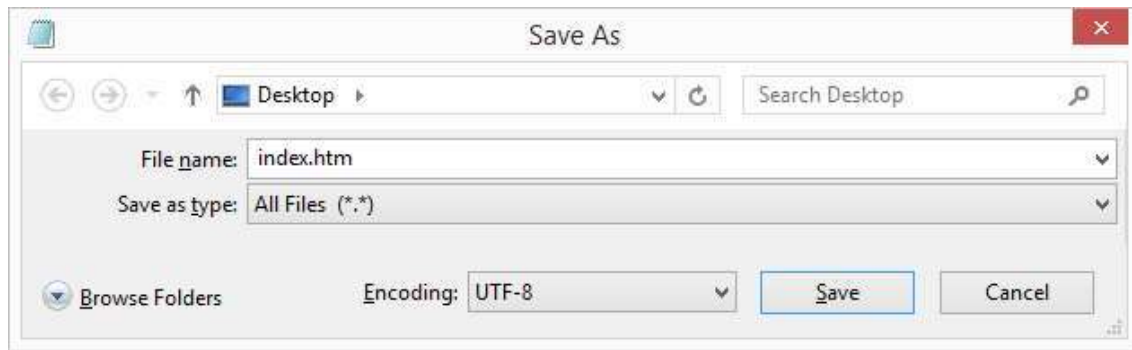
Step 2: Write Some HTML

```
<!DOCTYPE html>
<html>
<body>

<h1>My Name is Kailash</h1>

<p>And We are Learning HTML.</p>

</body>
</html>
```
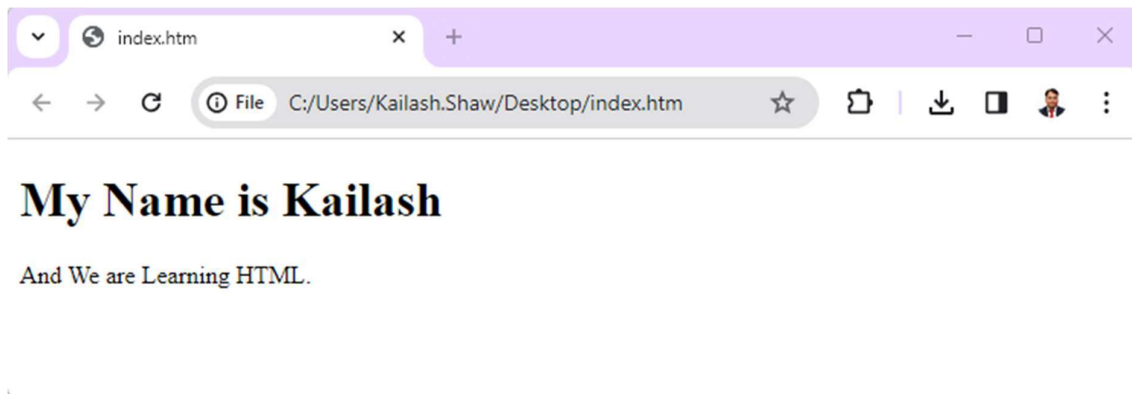
Step 3: Save the HTML Page as Index.htm

Step 4: View the HTML Page in Your Browser

HTML FORMS

Text Fields: The <input type="text"> defines a single-line input field for text input.

```
<form>
  <label for="fname">First name:</label><br>
  <input type="text" id="fname" name="fname"><b
r>
  <label for="lname">Last name:</label><br>
  <input type="text" id="lname" name="lname">
</form>
```

First name:

Last name:

Radio Buttons: The <input type="radio"> defines a radio button. Radio buttons let a user select ONE of a limited number of choices.

```
<p>Choose your favorite Web language:</p>

<form>
  <input type="radio" id="html" name="fav_language" value="HTML">
  <label for="html">HTML</label><br>
  <input type="radio" id="css" name="fav_language" value="CSS">
  <label for="css">CSS</label><br>
  <input type="radio" id="javascript" name="fav_language" value="Java
Script">
  <label for="javascript">JavaScript</label>
</form>
```

Choose your favorite Web language:

○ HTML
○ CSS
○ JavaScript

Checkboxes: The <input type="checkbox"> defines a checkbox. Checkboxes let a user select ZERO or MORE options of a limited number of choices.

```html
<form>
  <input type="checkbox" id="vehicle1" name="vehicle1" value="Bike">
  <label for="vehicle1"> I have a bike</label><br>
  <input type="checkbox" id="vehicle2" name="vehicle2" value="Car">
  <label for="vehicle2"> I have a car</label><br>
  <input type="checkbox" id="vehicle3" name="vehicle3" value="Boat">
  <label for="vehicle3"> I have a boat</label>
</form>
```

☐ I have a bike
☐ I have a car
☐ I have a boat

The Submit Button: The <input type="submit"> defines a button for submitting the form data to a form-handler. The form-handler is typically a file on the server with a script for processing input data. The form-handler is specified in the form's action attribute.

```html
<form action="/action_page.php">
  <label for="fname">First name:</label><br>
  <input type="text" id="fname" name="fname" value="John"><br>
  <label for="lname">Last name:</label><br>
  <input type="text" id="lname" name="lname" value="Doe"><br><br>
  <input type="submit" value="Submit">
</form>
```

First name:
Kailash
Last name:
Shaw

Submit

Experiment 1

Problem: Create a basic yet visually appealing webpage for a user registration form using only HTML. The page should include essential elements such as input fields for name, email, and password. Implement a clean and straightforward design that is responsive to different screen sizes. Ensure proper labeling and organization of form elements, demonstrating a fundamental understanding of HTML structure and layout principles. The challenge lies in creating an aesthetically pleasing and user-friendly registration page without using external CSS or JavaScript.

Example:

Output:

STUDENT REGISTRATION FORM

FIRST NAME	[input]	(max 30 characters a-z and A-Z)
Middle NAME	[input]	(max 30 characters a-z and A-Z)
LAST NAME	[input]	(max 30 characters a-z and A-Z)
DATE OF BIRTH	Day: ▾ Month: ▾ Year: ▾	
EMAIL ID	[input]	
MOBILE NUMBER	[input]	(10 digit number)
GENDER	Male ○ Female ○	
ADDRESS	[textarea]	
CITY	[input]	(max 30 characters a-z and A-Z)
PIN CODE	[input]	(6 digit number)
STATE	[input]	(max 30 characters a-z and A-Z)
COUNTRY	India	
HOBBIES	Coding ☐ Blog-Writing ☐ Hacking ☐ Cricket ☐ Others ☐ [input]	

Sl.No.	Examination	Board	Percentage	Year of Passing
1	Class X	[input]	[input]	[input]
2	Class XII	[input]	[input]	[input]
3	Graduation	[input]	[input]	[input]
4	Masters	[input]	[input]	[input]
		(10 char max)	(upto 2 decimal)	

QUALIFICATION

COURSES APPLIED FOR   B.Tech ○ M.Tech ○ PhD ○ MS ○

[Submit] [Reset]

Objective of Experiment:

Explain the Tag Used in Code:

Output with Your Filled Details:

Source Code, with description and with Output Need to be Uploaded to the Google Classroom.