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Experiment 5

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Subject Name: Full Stack Development – II

Subject Code: 23CSH-309

1. Aim: To verify the correctness and reliability of the EcoTrack React application by writing automated tests using Jest and React Testing Library, and by analyzing application behavior using debugging tools.

2. Objective:

- Understand the purpose of automated testing in frontend applications
- Write unit tests for JavaScript utility functions using Jest
- Use different Jest matchers to validate expected outputs and behaviors
- Test React components using React Testing Library
- Verify UI rendering by querying elements from the DOM
- Implement asynchronous testing using findBy and waitFor methods
- Apply mocking to simulate API or external data responses in tests
- Perform snapshot testing to detect unintended UI changes
- Debug failing tests and application logic using browser Developer Tools and breakpoints
- Analyze application behavior and errors systematically rather than manual checking

3. Implementation / Code:

▪ **Tools & Technologies Used:-**

- React.js
- JavaScript (ES6)
- Jest Testing Framework
- React Testing Library
- VS Code
- Node.js & npm
- Web Browser (Chrome DevTools)

▪ **Implementation Description:-**

- The EcoTrack application is tested to ensure correctness of both logic and UI behavior.
- Unit testing is performed on utility functions (e.g., calculator function) using Jest.
- React Testing Library is used to render components and verify UI structure.
- Snapshot testing is applied to detect unintended UI changes over time.



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- Automated tests improve application reliability and maintainability.
- Debugging tools such as browser DevTools and breakpoints help identify errors in logic or rendering.

▪ Sample Code Snippet:-

```
1 import { render, screen, fireEvent } from "@testing-library/react";
2 import App from "./App";
3
4 test("renders counter heading", () => {
5   render(<App />);
6   const heading = screen.getByText("Counter App");
7   expect(heading).toBeInTheDocument();
8 });
9
10 test("increments", () => {
11   render(<App />);
12   const button = screen.getByText("Increment");
13   const count = screen.getByTestId("count-value");
14
15   fireEvent.click(button);
16
17   expect(count).toHaveTextContent("1");
18 });
19 }
```

```
react-testing-app › src › components › Button.snapshot.test.js ...
1 import { render, screen } from "@testing-library/react";
2 import Button from "./Button";
3
4 test("renders button text", () => {
5   render(<Button label="Submit" />);
6   const buttonElement = screen.getByText("Submit");
7   expect(buttonElement).toBeInTheDocument();
8 });|
```

```
react-testing-app › src › components › Button.snapshot.test.js ...
1 import renderer from "react-test-renderer";
2 import Button from "./Button";
3
4 test("snapshot test", () => {
5   const tree = renderer.create(<Button label="Submit" />).toJSON();
6   expect(tree).toMatchSnapshot();
7 });|
```



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4. Output:

- All Jest test cases executed successfully
- Utility function test passed
- React component snapshot test passed
- No unintended UI changes detected
- EcoTrack component rendered correctly during testing
- Debugging tools confirmed correct state updates and DOM rendering

```
1 import React, { useState } from "react";
2 import Button from "./components/Button";
3
4 function App() {
5   const [count, setCount] = useState(0);
6
7   return (
8     <div>
9       <h1>Counter App</h1>
10      <p data-testid="count-value">{count}</p>
11      <Button
12        label="Increment"
13        onClick={() => setCount(count + 1)}
14      />
15    </div>
16  );
17}
18
19 export default App;
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

PASS src/utils/greet.test.js
PASS src/components/Button.test.js
PASS src/App.test.js

Test Suites: 5 passed, 5 total
Tests: 13 passed, 13 total
Snapshots: 1 passed, 1 total
Time: 3.793 s



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5. Learning Outcomes (What I Have Learnt):

- Importance of automated testing in frontend applications
- Writing unit tests using Jest framework
- Using matchers like `toBe()` and `toMatchSnapshot()`
- Testing React components with React Testing Library
- Validating UI rendering through DOM queries
- Understanding snapshot testing for UI stability
- Debugging React applications using DevTools and breakpoints
- Improving software reliability and maintainability through testing