1.Introduction to React

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📘 What is React?

React is an open-source JavaScript library developed by Facebook for building user interfaces, especially single-page applications (SPAs). It allows developers to create reusable UI components and manage state efficiently.

🎯 Key Concepts

✅ Component-Based Architecture

React encourages the creation of encapsulated components that manage their own state, then compose them to build complex UIs.

✅ Virtual DOM

React uses a virtual DOM to minimize direct DOM manipulation, improving performance by updating only what's necessary.

✅ Declarative UI

You describe *what* you want the UI to look like, and React figures out *how* to update it efficiently.

✅ Reusability

Components can be reused across different parts of the application with different data (props).

🛠️ Basic Example

```
import React from 'react';

function Welcome() {
  return <h1>Hey, There!</h1>;
}

export default Welcome;
```

This is a simple functional component — the building block of any React app.

🧠 Visual Concept Flowchart

```
flowchart TD
  A[Start: User Loads Page] --> B[React Components Rendered]
  B --> C[User Interacts with UI]
  C --> D[Component State Updates]
  D --> E[React Diffs Virtual DOM]
  E --> F[Minimal DOM Updates]
  F --> G[UI Rerendered Efficiently]
  G --> H[End: Updated View Rendered]
```

This diagram illustrates the basic flow of how React manages rendering and updates in response to user interactions.

🧭 When to Use React?

- Building interactive UIs for web apps
- Creating dynamic SPAs
- Managing complex UI state and effects

🔗 Useful Resources

- React Official Docs
- React GitHub

💡 Guidelines

- Focus on understanding how components work.
- Learn the mental model: components → props/state → UI.
- Don’t worry about tools like Redux or class-based components early on.

📝 Exercises & Quizzes

📌 Practice Exercises

1. **Create Your First Component**
   - Create a functional component named `Greeting` that displays your name.
2. **Modify JSX Output**
   - Change the component to return a custom message and include one HTML tag inside another (e.g., `<p>` inside `<div>`).
3. **Explore Reusability**
   - Create a `StudentCard` component that accepts `name` and `rollNo` as props and displays them.

❓ Quiz Questions

1. What is the virtual DOM and why does React use it?
a) It's a real browser DOM that React modifies directly
✅ **b) It's an in-memory representation of the real DOM to allow efficient updates**
c) It's a tool to convert HTML to JSX
d) It's only used in server-side rendering

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2. Which of the following is true about components in React?

a) Components can't accept inputs

✅ **b) Components are reusable**

c) Components update the DOM directly

d) Components must use class syntax

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3. JSX allows you to write HTML in JavaScript.

✅ **a) True**

b) False

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4. What is the return type of a functional component?

a) A class instance

✅ **b) JSX (which compiles to React.createElement calls)**

c) A string

d) An HTML file
