**4. ReactJS-HOL**

**1. Explain the Need and Benefits of Component Lifecycle**

The **React component lifecycle** refers to the series of methods invoked in different stages of a component's existence — from initialization and rendering to updates and unmounting. Understanding the lifecycle helps developers:

* Manage side effects such as data fetching or subscriptions.
* Optimize performance and prevent memory leaks.
* Maintain clean code by separating logic into appropriate lifecycle methods.

**Benefits:**

* Controlled **resource management** (e.g., API calls, event listeners).
* Improved **application performance** by limiting unnecessary re-renders.
* Enhanced **debugging** and **state tracking** through lifecycle monitoring.
* Ensures **cleanup** (e.g., timers, intervals) when components are removed.

**2. Identify Various Lifecycle Hook Methods**

React class components offer multiple **lifecycle hook methods**, grouped into 3 main phases:

**a. Mounting Phase (Component is inserted into the DOM)**

* constructor()
* static getDerivedStateFromProps()
* render()
* componentDidMount()

**b. Updating Phase (Component is re-rendered due to state/prop changes)**

* static getDerivedStateFromProps()
* shouldComponentUpdate()
* render()
* getSnapshotBeforeUpdate()
* componentDidUpdate()

**c. Unmounting Phase (Component is removed from the DOM)**

* componentWillUnmount()

**d. Error Handling Phase**

* componentDidCatch()
* static getDerivedStateFromError()

**3. List the Sequence of Steps in Rendering a Component**

**Mounting Sequence**

1. constructor() – Initializes state and binds methods.
2. getDerivedStateFromProps() – Syncs state from props (optional).
3. render() – Returns JSX to be rendered.
4. componentDidMount() – Executes after the component is rendered into the DOM.

**Updating Sequence**

1. getDerivedStateFromProps() – Updates state from new props.
2. shouldComponentUpdate() – Determines if re-render is needed.
3. render() – Renders updated JSX.
4. getSnapshotBeforeUpdate() – Captures state before DOM changes.
5. componentDidUpdate() – Executes after updates are flushed to the DOM.

**Unmounting Sequence**

* componentWillUnmount() – Used to perform cleanup tasks like clearing intervals or removing listeners.