School: ..... Campus: .....

Academic Year: ..... Subject Name: ..... Subject Code: .....

Semester: ..... Program: ..... Branch: ..... Specialization: .....

Date: .....

Applied and Action Learning

(Learning by Doing and Discovery)

Name of the Experiement : Blockchain in Supply Chains – Use Case Analysis

Objective/Aim:

To analyze how blockchain enhances transparency and traceability in supply chain management.

Apparatus/Software Used:

- Laptop
- Remix IDE
- MetaMask
- Vs code

Theory/Concept:

1. What is supply chain?
   A **supply chain** involves multiple parties — manufacturers, suppliers, transporters, warehouses, retailers, and customers — all coordinating to move goods from origin to destination.
2. Traditional supply chains often face problems like:

   - Lack of transparency
   - Delayed updates
   - Fraud and counterfeit products
   - Manual errors and inefficiency

3. Implementing blockchain into supplychain:
   1. IoT sensors can feed real-time data (temperature, humidity, handling conditions) directly to the blockchain.
   2. Guarantees that goods (like food or medicine) are stored and transported under correct conditions.
   3. Each product movement or transaction is recorded as a block in the blockchain. Every participant (manufacturer, transporter, retailer, etc.) has a copy of the ledger, ensuring no single point of failure.
   4. Data is immutable — once recorded, it cannot be changed or deleted, ensuring trust and authenticity.
   5. Smart contracts automatically execute predefined rules — such as payment release once goods are delivered and verified.

Procedure:

The **TraceHerb** project tracks the movement of **herbal products** from farmers to end customers.

Step 1: Define all stakeholders involved in the supply chain:

Farmer → Distributor → Retailer → Customer

Step 2: **Set Up Blockchain Network:**

- Use a blockchain platform (e.g., **Ethereum testnet via Remix IDE and MetaMask**).
- Create a **smart contract** to record transactions such as shipment data, quality status, and ownership changes.
- Each Stackholder has a **unique wallet address** to interact with the blockchain.

Step 3: **Simulate Transactions on the Blockchain:**

- Each participant enters shipment details (e.g., time, location, batch number, and quantity)/ or integrate iot device to make immutable.
- These details are stored as **blocks** on the blockchain ledger.

Step 4: **Implement Smart Contracts for Automation:**

- Use **smart contracts** to automate actions like:
  - Verifying delivery confirmations.
  - Releasing payments after successful delivery.
  - Recording temperature or quality data (if IoT sensors are integrated).

Step 5: **Verify Data Immutability:**

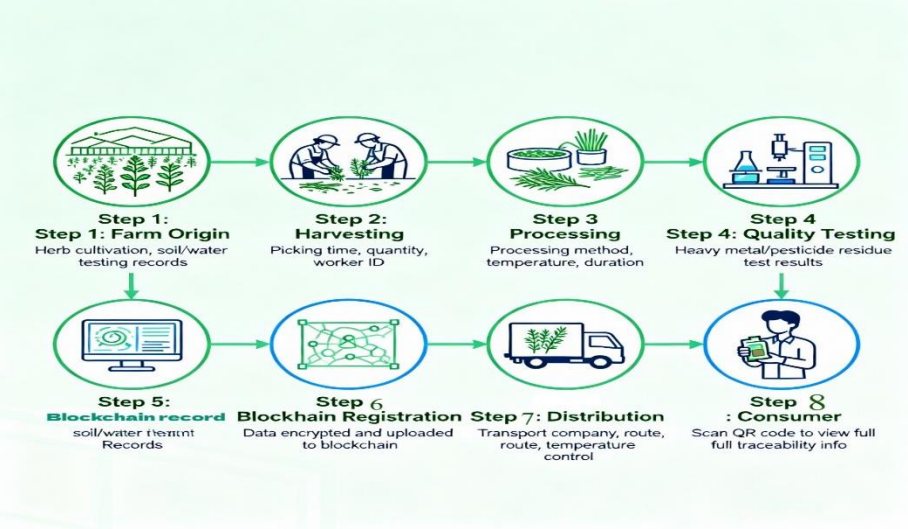
- Check that once shipment data is recorded, it **cannot be edited or deleted**.
- Demonstrate that blockchain ensures **data integrity and transparency** for all actors.

Step 6: **Track Product Through Ledger:**

- Visualize or query the blockchain ledger to view the **complete journey** of the product.
- Each block shows verified details about who handled the product and when.
- Customers can **trace authenticity** by checking product data on-chain.

Step 7: **Analyze the Results:**

- Confirm that blockchain successfully provides **end-to-end visibility**, **fraud prevention**, and **automated validation**.
- Highlight how TraceHerb enhances **trust, quality assurance, and traceability** in the herbal supply chain.



Observation Table:

Stage	Actor	Activity / Transaction Recorded	Verified by Blockchain Network	Data Immutable
1	**Farmer**	Adds new herb batch with details (origin, quantity, harvest date).	Yes	Yes
2	**Distributor**	Logs shipment details (batch ID, transport route, dispatch time).	Yes	Yes
3	**Retailer**	Updates inventory upon receiving shipment and verifies product condition.	Yes	Yes
4	**Customer**	Scans QR code to verify product authenticity and supply chain history.	Yes	Yes

ASSESSMENT

Rubrics	Full Mark	Marks Obtained	Remarks
Concept	10		
Planning and Execution/ Practical Simulation/ Programming	10		
Result and Interpretation	10		
Record of Applied and Action Learning	10		
Viva	10		
Total	**50**		

Signature of the Faculty:

Signature of the Student:
Name :
Regn. No.