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 : Truffle vs Hardhat – Dev Environment Showdown

Objective/Aim:

1. To understand and compare **Truffle** and **Hardhat**, the two most used Ethereum development environments.
2. To study how both frameworks handle **compiling, testing, and deploying** smart contracts.
3. To identify their **key features, advantages, and limitations**.
4. To select the most suitable tool for efficient **smart contract development and debugging**.

Apparatus/Software Used:

- Laptop/PC
- Google Browser
- Internet

Theory/Concept:

⬚ Truffle is one of the **oldest Ethereum development frameworks**.
⬚ It provides a complete **suite of tools** for compiling, migrating, and testing Solidity contracts.
⬚ Uses the **Ganache** tool for a local blockchain network.
⬚ Integrates easily with **web3.js** and **MetaMask**.
⬚ Follows a **structured, configuration-based workflow**.

Procedure:

```
Step 1: Setting up Truffle
bash
npm install -g truffle
truffle init
Step 2: Compile and Deploy using Truffle
bash
truffle compile
truffle migrate --network development
truffle console
Step 3: Setting up Hardhat
bash
npm install --save-dev hardhat
npx hardhat
Step 4: Compile and Deploy using Hardhat
bash
npx hardhat compile
npx hardhat node
npx hardhat run scripts/deploy.js --network localhost
```

Observation Table:

Feature	Truffle	Hardhat
Year Introduced	2015	2020
Compilation Speed	Moderate	Fast
Debugging	Limited	Advanced (Stack trace, console.log)
Plugins & Extensibility	Moderate	Highly flexible
Network Simulation	Ganache	Hardhat Network
Testing Framework	Mocha/Chai	Mocha/Chai
TypeScript Support	No	Yes
Developer Experience	Classic	Modern & developer-friendly

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**		