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 : Debugging Deep – Using Hardhat Console & Logs

Objective/Aim:

To understand and implement debugging techniques in Solidity using **Hardhat's console.log** and **transaction logs** for identifying and fixing errors in smart contracts.

Apparatus/Software Used:

- VS Code (Code editor)
- Node.js & npm (JavaScript runtime)
- Hardhat (Ethereum development environment)
- MetaMask (Ethereum wallet for test accounts)
- Sepolia Test Network or Local Hardhat Network
- Ethers.js / Web3.js – for connecting smart contracts to backend.

Procedure:

1. Create project & install Hardhat + ethers:

```
PS C:\Users\shrut\OneDrive\Desktop\blockchain_lab> mkdir debug-lab


    Directory: C:\Users\shrut\OneDrive\Desktop\blockchain_lab


Mode                 LastWriteTime         Length Name
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d-----          04-11-2025     00:10                debug-lab


PS C:\Users\shrut\OneDrive\Desktop\blockchain_lab> cd debug-lab
```

```
PS C:\Users\shrut\OneDrive\Desktop\blockchain_lab\debug-lab> npm init -y
Wrote to C:\Users\shrut\OneDrive\Desktop\blockchain_lab\debug-lab\package.json:

{
  "name": "debug-lab",
  "version": "1.0.0",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
```

Procedure:

```
PS C:\Users\shrut\OneDrive\Desktop\blockchain_lab\debug-lab> npm install --save-dev hardhat

added 59 packages, and audited 60 packages in 15s

16 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
PS C:\Users\shrut\OneDrive\Desktop\blockchain_lab\debug-lab> npm install --save-dev @nomiclabs/hardhat-ethers ethers
```

```
PS D:\WEB 3\Test> npx hardhat test
Hardhat only supports ESM projects.

Please make sure you have `"type": "module"` in your package.json.

You can set it automatically by running:

npm pkg set type="module"
```

```
PS D:\WEB 3\fresh-test> npm install --save-dev @nomiclabs/hardhat-ethers ethers@5.7.2 chai

added 27 packages, changed 9 packages, and audited 384 packages in 38s

107 packages are looking for funding
  run `npm fund` for details

11 vulnerabilities (7 low, 3 high, 1 critical)

To address issues that do not require attention, run:
  npm audit fix

Some issues need review, and may require choosing
a different dependency.

Run `npm audit` for details.
PS D:\WEB 3\fresh-test>
```

Observation:

Hardhat's built-in **console.log** provides an efficient way to debug Solidity smart contracts before deployment. This reduces logical and runtime errors, saving time and gas in real blockchain environments.

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 Student:

Name :

Signature of the Faculty:

Regn. No. :

Page No............

*As applicable according to the experiment.
Two sheets per experiment (10-20) to be used.