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 :** Decentralized Identity – DID and Credential Demo

## Objective/Aim:

To understand the concept of **Decentralized Identifiers (DIDs)** and **Verifiable Credentials (VCs)** by performing a demo that showcases how blockchain can be used to create, issue, and verify secure digital identities without centralized authorities.

## Apparatus/Software Used:

- MetaMask Wallet
- Node.js and npm
- Visual Studio Code (VS Code)
- DID and VC Tools:
- **SpruceID Playground** (https://playground.spruceid.dev/)
- **Veramo Framework** (https://veramo.io/)
- **W3C DID Resolver**
- Blockchain Test Network (Ethereum / Polygon Testnet)

## Theory/Concept:

- **Decentralized Identity (DID)** is a blockchain-based identity management system that gives individuals full control over their digital identity without relying on centralized authorities like governments or corporations.
- **Key Concepts:**
- **DID (Decentralized Identifier):**
  A globally unique identifier that resolves to DID Documents containing public keys and service endpoints. Example:

```
did:ethr:0x123456789abcdef...
```

- **DID Document:**
  Contains verification keys and authentication methods for the holder's identity.
- **Verifiable Credentials (VCs):**
  Digitally signed credentials (like certificates, licenses, or ID proofs) that can be verified cryptographically without revealing private data.

## Procedure

**Setup Environment:**

- Install Node.js and VS Code.
- Connect MetaMask to a test network (e.g., Polygon Mumbai or Ethereum Sepolia).

**Open SpruceID Playground**

- Go to https://playground.spruceid.dev/.
- Select the **DID & VC Demo** option.

**Generate a DID:**

- Choose "Create a DID" (using did:key or did:ethr method).
- Copy your generated DID and note its structure.

**Create Verifiable Credential (VC):**

- Select the "Issue VC" option.
- Fill credential details (name, issuer DID, subject DID, claim details like "Student of XYZ College").
- Generate and sign the credential.

**Verify the Credential:**

- Paste the generated VC into the **Verification Tool** within SpruceID Playground.
- Observe the verification process — the cryptographic proof validates authenticity and issuer identity.

**Use Veramo Framework (Optional):**

- Install Veramo CLI:

```
npm install -g @veramo/cli
```

- 

Create an agent, generate DIDs, and issue/verify credentials via CLI.

**Record Details:**

- Note the DID format, credential signature, and verification output.

## Observation Table:

Successfully created a DID (did:ethr:...) using SpruceID Playground.
Issued a verifiable credential linking an identity claim (e.g., student certificate).
Credential verified successfully using cryptographic proof.
The process required no centralized authority — only blockchain-based trust.

**ASSESSMENT**

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

***Signature of the Faculty:*** ***Signature of the Student:***

Name No.