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 : Cross the Chain – Bridge or Interoperability Demo

Objective/Aim:

To understand and demonstrate **blockchain interoperability** by performing a **cross-chain asset transfer** or communication using blockchain bridge platforms that connect different networks like Ethereum, Polygon, or Binance Smart Chain (BSC).

Apparatus/Software Used:

- Node.js and npm (optional for developers)
- Testnet Faucets for ETH, MATIC, or BNB
- Cross-Chain Bridge Tools:
- **Polygon Bridge** → https://wallet.polygon.technology/bridge
- **BSC Bridge** → https://bridge.bnbchain.org/
- **Chainlink CCIP Demo** → https://ccip.chain.link/
- **Axelar Network Testnet** → https://axelarscan.io/

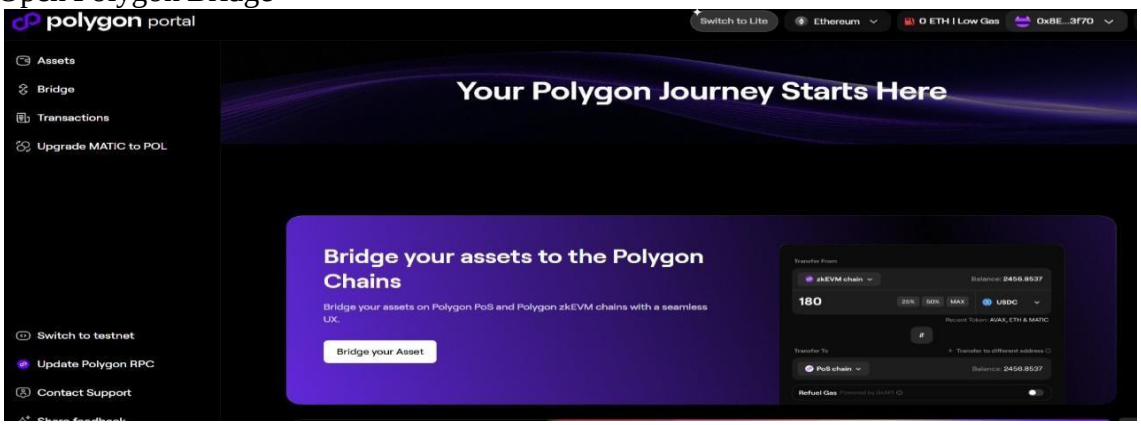
Theory/Concept:

- Blockchain interoperability allows communication and data transfer between multiple blockchain networks.
  Since most blockchains operate independently, interoperability ensures tokens, smart contracts, and data can move seamlessly between them using bridges or cross-chain protocols.
- **Key Concepts:**
- **Blockchain Bridge:**
  A protocol connecting two blockchains, allowing token transfers and contract calls across them.
- **Wrapped Tokens:**
  When tokens are moved across chains, they're "locked" on one network and "minted" as wrapped versions on another (e.g., ETH → WETH or wETH on Polygon).
- **Cross-Chain Message Passing**:
  Some modern interoperability protocols (like Chainlink CCIP, Axelar, LayerZero) transfer data or instructions securely between smart contracts across chains.

Procedure

- Setup Wallet and Networks:
- Install MetaMask and add test networks (Ethereum Sepolia, Polygon Mumbai, BSC Testnet).
- Get test tokens from respective faucets.

  Select a Bridge Platform:
- Open Polygon Bridge

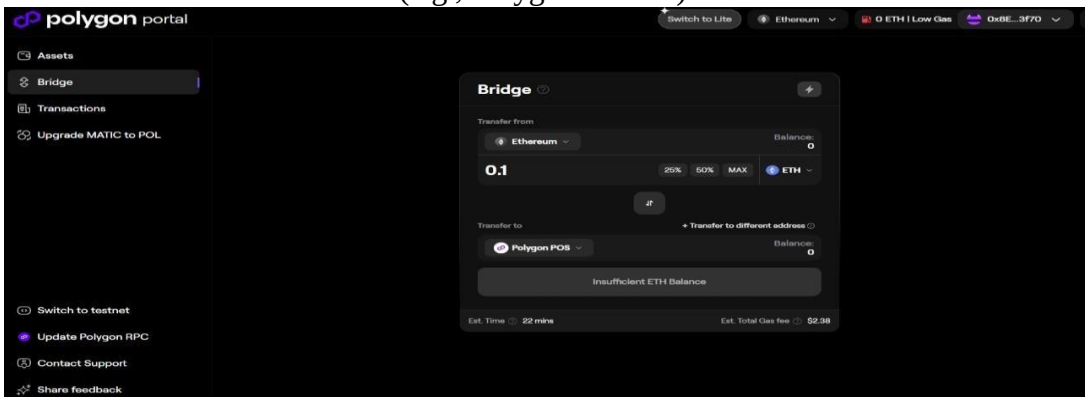


Connect Wallet:

- Connect your MetaMask wallet to the source network (e.g., Ethereum Testnet).

Select Token and Destination Chain:

- Choose the token you want to bridge (e.g., 0.1 ETH).
- Select the destination network (e.g., Polygon Testnet).



Initiate the Bridge Transaction:

- Approve the transaction in MetaMask.
- Observe confirmation and "lock" of tokens on the source chain.

Wait for Cross-Chain Confirmation:

- The bridge protocol mints equivalent wrapped tokens on the destination chain.
- Check transaction details on explorers (Etherscan + Polygonscan).

Verify Token Receipt:

- Switch MetaMask to the destination network (Polygon).
- Confirm wrapped tokens (e.g., wETH) appear in your wallet.

Observation Table:

Bridge successfully transferred assets between Ethereum and Polygon Testnets.
Transaction required approval and confirmation on both chains.
Tokens were locked on the source network and minted as wrapped tokens on the destination.
Transaction details verified on both block explorers.

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 Student:
Name :
Regn. No.

Signature of the Faculty: