



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 Experiment: PoW vs PoS – Consensus Mechanism Comparison

*Objectives/Aim:

The objective of this lab is to explore and critically compare the two leading blockchain consensus mechanisms: Proof of Work (PoW) and Proof of Stake (PoS). By examining their differences in security, energy consumption, and network efficiency, this lab aims to provide a deeper understanding of how each mechanism influences blockchain performance, scalability, and decentralization. We will gain practical insights to assess the strengths and trade-offs of PoW and PoS for real-world applications.

*software used:

- Web Browser
- Blockchain Explorer
- Text editor for documentation

* Theory/Concept:

Consensus Mechanisms:

In a decentralized blockchain network, consensus mechanisms are protocols that ensure all nodes (participants) agree on the current state of the blockchain. They prevent fraudulent activities such as double spending and maintain the integrity and security of the distributed ledger without the need for a central authority.

Proof of Work (PoW)

PoW requires miners to solve complex cryptographic puzzles using computational power to validate transactions and add new blocks to the blockchain.

How it Works:

- Miners compete to find a valid hash that meets a difficulty target by performing many hash calculations.
- The first miner to solve the puzzle broadcasts the block, which is then verified and added to the chain.
- The miner receives rewards for their work.

Proof of Stake (PoS)

PoS selects validators to create new blocks based on the amount of cryptocurrency they stake as collateral, reducing energy use.

How it Works:

- Validators are chosen proportionally to their stake to propose and validate blocks.
- Dishonest validators risk losing their staked coins (slashing).
- Validators earn rewards and transaction fees.

*Observation:

- Energy Efficiency: PoS is significantly more energy-efficient than PoW, as it does not require intensive computational work.
- Security Approach: PoW relies on computational power to secure the network, while PoS uses economic incentives and penalties to maintain security.
- Transaction Speed: PoS generally allows faster transaction confirmation and block finality compared to PoW.
- Decentralization Risks: PoW can face centralization due to mining pools, whereas PoS may risk centralization if large stakeholders dominate the network.

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**