School:.....Campus:.....

AcademicYear:.....SubjectName:.....SubjectCode:.....

Semester:.....Program:.....Branch:.....Specialization:.....

Date: .....

Applied and Action Learning

(LearningbyDoingandDiscovery)

Name of the Experiement : PoW vs PoS –Consensus Mechanism Comparison

* Coding Phase: Pseudo Code / Flow Chart / Algorithm

Introduction

The purpose of this experiment is to study and compare the two most common blockchain consensus mechanisms — Proof of Work (PoW) and Proof of Stake (PoS).
This comparison helps in understanding how blockchain networks achieve agreement on transactions, maintain security, and validate new blocks. The study will also highlight the differences in performance, energy consumption, and scalability between both mechanisms.

* Softwares used

- Chrome Web Browser
- Blockchain Explorers (e.g., Etherscan)
- Text Editor (VS Code / Notepad++)

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Twosheetsperexperiment(10-20)tobeused.

* Implementation Phase: Final Output (no error

1. Definition of Proof of Work (PoW)

Proof of Work is a consensus mechanism in which miners compete to solve cryptographic puzzles using computational power. The first miner to find a valid solution adds a new block to the blockchain and receives a reward.
This process ensures network security but consumes significant energy.

2. Definition of Proof of Stake (PoS)

Proof of Stake selects validators based on the amount of cryptocurrency they lock (stake) in the network. Instead of mining, validators are chosen to propose and validate new blocks.
This mechanism consumes far less energy and provides faster transaction finality.

3. Working Steps of PoW

1. **Mining:** Miners compete to solve a mathematical puzzle.
2. **Nonce Finding:** Each miner tries different nonce values to achieve a hash below the target difficulty.
3. **Block Validation:** The first miner who finds a valid hash broadcasts the block. Other nodes verify and add it to the chain.

4. Working Steps of PoS

1. **Validator Selection:** Validators are selected randomly based on their stake amount.
2. **Block Proposal:** The chosen validator proposes a new block.
3. **Validation and Finalization:** Other validators confirm the block, and once approved, it becomes part of the blockchain.

5. Comparison Table

Aspect	Proof of Work (PoW)	Proof of Stake (PoS)
Basis of Operation	Computational effort	Amount of coins staked
Energy Consumption	Very high	Very low
Hardware Requirement	Specialized mining rigs (GPU/ASIC)	Standard computer
Transaction Speed	Slower due to mining competition	Faster validation
Security	High (requires 51% computing power attack)	High (requires 51% stake attack)
Scalability	Less scalable	More scalable
Examples	Bitcoin, early Ethereum	Ethereum 2.0, Cardano, Solana

* Implementation Phase: Final Output (no error)

→ Proof of Work (PoW) depends on computational power for validation.
→ It provides strong network security but consumes more energy.

→ Proof of Stake (PoS) selects validators based on staked coins.
→ It is more energy-efficient, faster, and environment-friendly.

Hence, both mechanisms achieve consensus differently, with PoS emerging as the more sustainable alternative for modern blockchain systems.

* Observations

It was observed that Proof of Work (PoW) ensures robust security through computational difficulty but consumes large amounts of energy and time.
In contrast, Proof of Stake (PoS) provides a more sustainable and energy-efficient alternative while maintaining good security and faster transaction processing.

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 :

Regn. No. :

Signature of the Faculty:

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