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 : PoW vs PoS – Consensus Mechanism Comparison

Objective/Aim:

To study and compare two widely used blockchain consensus mechanisms — **Proof-of-Work (PoW)** and **Proof-of- Stake (PoS)** — based on their working principles, advantages, limitations, and applications.

Apparatus/Software Used:

- Blockchain demo (simulator websites or animations)
- Whiteboard / PowerPoint (for tabular comparison)
- Ethereum testnets:
  - Ethereum Mainnet (PoS)
  - Bitcoin network (PoW) for reference

Theory/Concept:

Consensus Mechanism:

A process that allows distributed blockchain nodes to agree on the state of the network (ledger).

Proof-of-Work (PoW):

- Miners solve cryptographic puzzles (hashing).
- First miner to solve broadcasts block to network.
- Requires heavy computational power and electricity.
- Example: **Bitcoin, Ethereum (before Merge)**.

Proof-of-Stake (PoS):

- Validators are chosen based on the amount of cryptocurrency they stake.
- No energy-intensive computations required.
- Provides faster and eco-friendly block validation.
- Example: **Ethereum 2.0 (after Merge), Cardano, Solana**.

Procedure:

- Open a blockchain demo (PoW mining simulator and PoS explanation).

- For **PoW Simulation**:
  - Enter block data and click *"Mine"*.
  - Observe nonce changes until the hash meets difficulty criteria.
  - Note energy/time consumption.

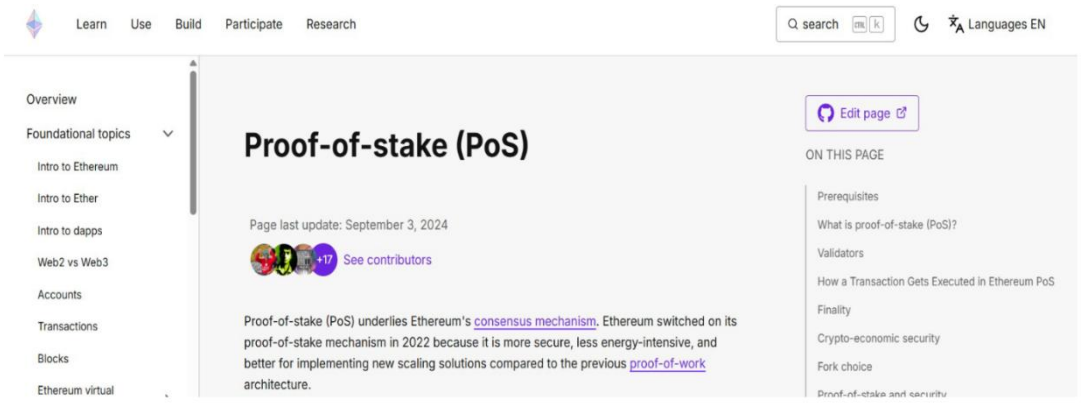
- For **PoS Demonstration**:
  - Choose validators based on stake.
  - Observe block selection without mining.
  - Compare PoW vs PoS in terms of **energy, speed, scalability, and security**.

Here are some reliable sources you can open and research about pow and pos.

Ethereum.org – Proof-of-stake (PoS)
🔗 https://ethereum.org/en/developers/docs/consensus-mechanisms/pos/

Ethereum.org – Proof-of-work (PoW)
🔗 https://ethereum.org/en/developers/docs/consensus-mechanisms/pow/

Investopedia – Proof of Work vs Proof of Stake
🔗 https://www.investopedia.com/terms/p/proof-work.asp
🔗 https://www.investopedia.com/terms/p/proof-stake-pos.asp



Observation Table:

Feature	Proof-of-Work (PoW)	Proof-of-Stake (PoS)
Energy Consumption	Very High (mining rigs)	Very Low
Hardware Requirement	Specialized (ASICs/GPUs)	Normal computer nodes
Transaction Speed	Slower (10 min/block in Bitcoin)	Faster (seconds)
Security Basis	Computational difficulty	Economic stake
Risk	51% attack (if >50% hash power)	Stake centralization/slashing
Examples	Bitcoin, Litecoin, Dogecoin	Ethereum 2.0, Cardano, Solana

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: