Centurion University
Shaping Lives... Empowering Communities...

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 explore and differentiate between two major blockchain consensus methods — **Proof of Work (PoW)** and **Proof of Stake (PoS)** — focusing on how they authenticate transactions, safeguard the blockchain network, and maintain decentralized control.

Apparatus/Software Used:

- Laptop / Computer
- Web Browser (e.g., Chrome, Brave)
- Internet Connection
- Blockchain Explorer (Etherscan / BTC Explorer)
- Reference Networks: Bitcoin (PoW) and Ethereum (PoS)

Theory/Concept:

Definition of Consensus Mechanism:

A consensus mechanism is a process through which nodes in a blockchain system come to an agreement about the validity of transactions and blocks. It ensures the ledger remains accurate and tamper-proof without needing a central governing body.

1. Proof of Work (PoW):

In PoW, miners compete to solve cryptographic puzzles using their computing power. The first miner to find the correct hash adds a new block to the chain and earns a reward. Examples include Bitcoin, Litecoin, and older versions of Ethereum.

Main Characteristics:

- Consumes large amounts of energy
- Highly secure due to computational difficulty
- Slower in confirming transactions

2. Proof of Stake (PoS):

In PoS, validators are selected to create blocks depending on how many coins they have locked (staked) in the system. The more coins staked, the higher the chance of being chosen. Examples include Ethereum (after the Merge), Cardano, and Polygon.

Procedure:

- Observe the Proof of Work mechanism on the Bitcoin blockchain by analyzing mining and block validation processes.
- Examine Ethereum's Proof of Stake system (post-Merge) to understand validator selection, staking, and reward distribution.
- Compare both mechanisms in terms of speed, energy consumption, security, and scalability..

Observation Table:

Parameter	Proof of Work (PoW)	Proof of Stake (PoS)
Basic Principle	Competing through computational mining	Staking tokens to validate blocks
Resource Used	High electricity and computing hardware	Minimal power, staking capital
Validator Selection	Based on solving mathematical puzzles	Based on number of tokens staked
Transaction Speed	Slower (e.g., 10 minutes/block – Bitcoin)	Faster (e.g., 12–15 seconds/block – Ethereum)
Energy Efficiency	Low – very high power usage	High – energy-saving design
Hardware Requirement	Expensive mining rigs (ASICs, GPUs)	Regular systems or validator nodes
Security Model	Prone to 51% hash rate attacks	Prone to 51% stake dominance (economically difficult)
Example Networks	Bitcoin, Litecoin	Ethereum, 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: