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 compare the Proof-of-Work (PoW) and Proof-of-Stake (PoS) consensus mechanisms used in blockchain networks.

Apparatus/Software Used:

- Chrom Web Browser
- Blockchain Explorer
- Text editor

Theory/Concept:

Consensus mechanisms are protocols that allow distributed blockchain nodes to agree on the state of the ledger.

1. **Proof-of-Work (PoW)**
   - Introduced by Bitcoin in 2009.
   - Miners compete to solve complex mathematical puzzles using computational power.
   - First to solve the puzzle validates the block and adds it to the blockchain.
   - Provides high security but requires large amounts of electricity and specialized hardware.
2. **Proof-of-Stake (PoS)**
   - Validators are chosen to create new blocks based on the amount of cryptocurrency they "stake" as collateral.
   - Does not require energy-intensive computations.
   - Offers scalability and energy efficiency compared to PoW.
   - Security depends on the stake locked by validators.

Procedure:

- Study the working principles of PoW and PoS.
- Compare their key characteristics such as energy consumption, security, scalability, and decentralization.
- Prepare a comparative observation table.
- Draw conclusions on their advantages and disadvantages.

Observation Table:

Feature	Proof-of-Work (PoW)	Proof-of-Stake (PoS)
Energy Usage	Very high (computationally intensive)	Very low (energy-efficient)
Security	Highly secure, attack requires huge energy	Secure, but depends on economic stake
Hardware Needs	Requires powerful mining hardware (ASICs/GPUs)	No special hardware needed
Scalability	Limited, slower block confirmation	More scalable, faster transactions
Decentralization	Risk of centralization due to mining pools	Risk of centralization if few hold most stake
Cost of Attack	Very expensive (electricity + hardware)	Expensive, attacker must own majority stake
Examples	Bitcoin, Litecoin	Ethereum 2.0, Cardano, Polkadot

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: