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 :**

## * Coding Phase: Pseudo Code / Flow Chart / Algorithm

A peer-to-peer (P2P) network is a decentralized system where every node acts as both a client and a server, directly sharing data and resources without any central authority.

In blockchain, P2P networks allow all nodes to work together to store, verify, and update the distributed ledger, ensuring transparency, security, and reliability.

Nodes in a P2P blockchain communicate by sending transactions and blocks to each other, spreading information throughout the network. Consensus mechanisms help these nodes agree on the current state of the blockchain. Because there's no central server, the network avoids single points of failure and resists control or censorship.

Simulating a P2P network helps demonstrate how messages spread, how peers are discovered, and how data stays synchronized — all of which are key parts of blockchain operation.

- ➢ Create multiple nodes in the simulation, each able to independently send and receive messages.
- ➢ Add a peer discovery process so nodes can find and connect with other nodes in the network.
- ➢ Simulate message broadcasting, where a transaction or block from one node is shared with others until all nodes have received it.
- ➢ Introduce factors like network delay, message drops, or node crashes to test how strong and reliable the network is.
- ➢ Optionally include basic consensus or validation rules to imitate real blockchain behavior.
- ➢ Observe the simulation to ensure that data is spreading correctly and all nodes stay synchronized.

# * Softwares used

- ❖ Network simulation tools or libraries (e.g., peersim, libp2p)
- ❖ MetaMask
- ❖ Local test environment or virtual machines for distributed node

*As applicable according to the experiment.
Two sheets per experiment (10-20) to be used.

# * Observations

- The P2P network shares data efficiently through direct communication between decentralized nodes.
- There is no central authority — every node plays a role in maintaining the network's strength and reliability.
- Each node keeps an up-to-date copy of the ledger by receiving and verifying data from other nodes.
- The simulation demonstrates how blockchain technology relies on decentralization, resilience, and distributed trust.

# ASSESMENT

| 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. :*

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