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

Academic Year: .... Subject Name: .... Subject Code: ....

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

Date: ....

Applied and Action Learning
(Learning by Doing and Discovery)

Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

Name of the Experiement :   Build the network - Peer-to-Peer Simulation

* Coding Phase: Pseudo Code / Flow Chart / Algorithm

ALGORITHM:

1. Start

2. Set up multiple nodesin the simulation, each capable of sending and receiving messages autonomously.

3. Implement peer discovery protocolswhere nodes identify and connect to other nodes.

4. Simulate message broadcastingwhere a transaction or block is sent from one node and relayed to peers until all

   nodes receive it.

5. Introduce network latency, message loss, or node failures to observe network robustness.

6. Option, implement simple consensus or validation logic to mimic blockchain operations.

7. Monitor the network to verify successful data propagationand node synchronization.

8. End

* Software used

1. Network simulation tools or libraries

2.MetaMask

3.Local test environment or virtual machines for distributed node

* Implementation Phase: Final Output (no error)

The Peer-to-Peer (P2P) network is the backbone of decentralized systems like blockchain. It's an architecture where every participant, called a node, acts as both aclient and a server, directly sharing information and resources without needing a central intermediary.

For blockchain, P2P communication allows all nodes to work together to collectively maintain and validate the distributed ledger, ensuring properties like transparency, network resilience, and immutability.

Within this network, nodes reliably propagate transactions and newly mined blocks by broadcasting them to all connected peers. Consensus protocols then run on top of this structure to ensure all nodes agree on a single, correct state of the blockchain.

This design eliminates single points of failure and resists censorship. Simulating a P2P network helps illustrate critical decentralized operations such as peer discovery, reliable message propagation, and seamless data Synchronization.

*Observations

1. The P2P networkeffectively and quickly distributes data across the system through decentralized peer-to-peer communication.

2. No single node holds control; every participant (node) is vital and contributes directly to the overall robustnessand fault toleranceof the network.

3. Nodes successfully maintain consistent, synchronized copies of the ledgerby receiving, validating, and sharing new data.

4. The simulation clearly demonstrates the resilienceand fundamental decentralized Trust modelthat are cornerstones of blockchain technology.

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:

Page No............

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