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 : Build the Network – Peer-to-Peer Simulation

Objective/Aim:

To simulate a Peer-to-Peer (P2P) network that demonstrates how nodes in a blockchain communicate and propagate messages without a centralized server.

Apparatus/Software Used:

- MetaMsk wallet
- VS code
- Brave for searching

Theory concept:

A **Peer-to-Peer (P2P)** network is a decentralized communication model where each node (peer) acts as both a client and a server. Instead of relying on a central authority, peers directly exchange data, forming the foundation of **blockchain networks** like Bitcoin and Ethereum.

Key Concepts:

- **Decentralization:** No single point of control; all nodes share equal roles.
- **Peer Discovery:** Process of finding and connecting with other nodes in the network.
- **Message Propagation:** Nodes use a flooding or gossip protocol to broadcast transactions or blocks.
- **Fault Tolerance:** Even if some nodes fail, others can maintain the network.
- **Overlay Network:** Logical layer built on top of the internet for direct peer communication.

In a blockchain, P2P networking ensures every node eventually receives and validates new blocks or transactions without central coordination.

Procedure:

- **Set Up Environment:** Install Node.js or Python on your computer.
- **Create Project Folder:** Make a folder to store files for the simulation.
- **Plan Network:** Decide how many nodes (e.g., 3 or 4) you want to simulate.
- **Assign Ports:** Give each node a different port number (e.g., 7000, 7001, 7002).
- **Start Nodes:** Run the first node as the main one, then connect other nodes to it.
- **Send Message:** Send a message from one node and see it reach all other nodes.
- **Observe Results:** Note which nodes received the message and how quickly.
- **Test Failure:** Stop one node and check if others still communicate.

Observation:

- Message reached all peers successfully.
- Delay increased slightly with more nodes.
- Network still worked when one node was stopped.

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 :

Signature of the Faculty:

Regn. No. :

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