Centurion University

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**

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

**Initialize Network**

Define the number of nodes (peers) participating in the network.
Assign each node a unique ID and empty ledger/memory.

**Create Connections**

Each node connects to a few other nodes randomly (simulating a mesh network).
Maintain a list of peers each node can send/receive messages from.

**Message Broadcast**

One node (the initiator) sends a transaction or message to its peers.
Each peer forwards the message to its connected nodes (except the sender).

**Verification Process**

Each node validates the message (e.g., checks if it's new and not already received).
Invalid or duplicate messages are ignored.

**Ledger Update**

If the message (transaction/block) is valid, it's added to the node's ledger.

**Consensus (Optional)**

If simulating blockchain consensus, include a simple rule like:
The first valid message received by all nodes is accepted.
Nodes reject conflicting data.

**End Simulation**

Display how many nodes successfully received and accepted the message.
Show that the network achieved synchronization without a central server.

## Software used

1. MetaMask Wallet
2. VS Code.
3. MS Word.
4. Brave for researching.



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

## * Implementation Phase: Final Output (no error)

- Input: Number of peers (e.g., 6)
- Establish peer connections.
- Node 1 broadcasts a message.
- Nodes 2–6 receive and validate the message.
- Ledger updated in each node.
- Output:

Message broadcast from Node 1
Node 2 received message from Node 1
Node 3 received message from Node 2
Node 4 received message from Node 3
All nodes synchronized □

## * Observations:

- The message reaches all nodes without any central server.
- Duplicate messages are automatically avoided using validation.
- The network demonstrates **decentralization**, **fault tolerance**, and **equal node importance**.
- Communication delay or missing peers can affect synchronization — similar to real blockchain networks.
- When consensus rules are added, the simulation behaves like a mini blockchain environment.



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## 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:***



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