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

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

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

Date: ....

Centurion UNIVERSITY

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.

* 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.

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.