



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 Experiment :

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

#### Hash your First Block

#### Introduction to Blockchain

Blockchain is a type of distributed, peer-to-peer ledger that is secured using cryptography. It functions as an append-only record, meaning data can only be added, not removed, and altering past records is highly difficult. Updates to the ledger occur only when there is consensus or agreement among the network participants.

#### Key Features of Blockchain

##### 1. Decentralization

– No single authority controls the network; data is shared among all participants.

##### 2. Immutability

– Once recorded, data cannot be modified or deleted.

##### 3. Transparency

– All participants can view the transactions recorded on the blockchain.

##### 4. Smart Contracts

– Self-running programs that execute predefined actions when certain conditions are met.

##### 5. High Security

– Strong cryptographic methods protect data from tampering.

##### 6. Consensus Protocols

– Mechanisms that help network participants agree on the validity of transactions.

##### 7. Distributed Ledger

– A synchronized record of transactions maintained across multiple locations.

##### 8. Privacy & Anonymity

– Users can interact without revealing their true identities while keeping data secure.

## Blockchain Architecture Overview

A blockchain system is made up of several main components:

1. **Nodes** – These are devices or computers that connect to and take part in the blockchain network.
2. **Blocks** – Collections of validated transactions grouped together and added to the blockchain in order, with each block permanently linked to the previous one.
3. **Consensus Mechanisms** – Algorithms or protocols that allow nodes to reach agreement on the state of the blockchain and verify transactions.
  - Common examples include:
    - Proof of Work (PoW)
    - Proof of Stake (PoS)
4. **Smart Contracts** – Digital agreements that automatically execute when predefined terms are satisfied, removing the need for intermediaries.
5. **Cryptographic Protection** – Security measures like hashing and digital signatures that make transactions resistant to alteration and ensure transparency.
6. **Networking & Protocols** – The communication rules and systems that enable nodes to share information and validate data within the blockchain network.

## Building the First Block (Genesis Block)

### 1. Set the Initial Data

For the very first block in the chain, include some starting information — this could be a simple message or an initial transaction record.

### 2. Prepare the Block Header

Fill in the header details. Since there is no block before this one, the “previous block hash” field will either be blank or set to a fixed default value.

### 3. Generate the Block Hash

Use a cryptographic hashing algorithm (such as SHA-256) on the block’s complete contents (both header and data) to produce its unique hash value.

Keep creating new blocks by repeating the same steps — define the data, prepare the header, compute the hash, and connect it to the hash of the preceding block — until the blockchain grows as needed.

### **\* Softwares used**

Brave Browser

## \* Testing Phase: Compilation of Code (error detection)

### 1.1st Block ,no Modification

Block:	# 1
Nonce:	11316
Data:	
Prev:	00
Hash:	000015783b764259d382017d91a36d206d0600e2cbb3567748f
<input type="button" value="Mine"/>	

### Blockchain

Block: # 1	Block: # 2	Block: # 3
Nonce: 11316	Nonce: 35230	Nonce: 12937
Data:	Data:	Data:
Prev: 00	Prev: 000015783b764259d382017d91a36d206d0600e2cbb3567748f46a33f49297cf	Prev: 000012f49b916e99878f8d98a7864e977ae83e54f5140bd04452cdf4043c19
Hash: 000015783b764259d382017d91a36d206d0600e2cbb3567748f46a33f49297cf	Hash: 000012f49b916e99878f8d98a7864e977ae83e54f5140bd04452cdf4043c19	Hash: 000009015ce2a80b612160e5a07705450f40d07ceb70b05d0d
<input type="button" value="Mine"/>	<input type="button" value="Mine"/>	<input type="button" value="Mine"/>

### 2.Data Inserted in First Block

### Blockchain

Block: # 1	Block: # 2	Block: # 3
Nonce: 11316	Nonce: 35230	Nonce: 12937
Data: Adyasha	Data:	Data:
Prev: 00	Prev: 046524ff451b145ee0448ac9d9c06b70a29ec552d12e340e388913a55ff1859	Prev: 927dc440791bfcdda05879e948270805dda7a0e4ff020f1d0e4
Hash: 046524ff451b145ee0448ac9d9c06b70a29ec552d12e340e388913a55ff1859	Hash: 927dc440791bfcdda05879e948270805dda7a0e4ff020f1d0e420852d01f9917	Hash: 98301c47733a0b4e6742cd0405a238a18c640e40f0b060b022
<input type="button" value="Mine"/>	<input type="button" value="Mine"/>	<input type="button" value="Mine"/>

### 3.First Block get mined

#### Blockchain

Block: # 1

Nonce: 168927

Data: Adjasha

Prev: 00

Hash: 0000ef8d25992abbe67343287c43f8691f00eb3f391624cc28250bf08233bfbd

Mine

Block: # 2

Nonce: 35230

Data:

Prev: 0000ef8d25992abbe67343287c43f8691f00eb3f391624cc28250bf08233bfbd

Hash: cc1a567fee59cca7871a4fab15f0b408fb041325c8db148a39385a82eeab0b34d

Mine

Block: # 3

Nonce: 12937

Data:

Prev: cc1a567fee59cca7871a4fab15f0b408fb041325c8db148a39385a82eeab0b34d

Hash: 31649bcb0229582340aa9663c8d8940ae5458027c24a1bf44f9b3

Mine

### 4.Data inserted and all mined

Block: # 1

Nonce: 168927

Data: Adjasha

Prev: 00

Hash: 0000ef8d25992abbe67343287c43f8691f00eb3f391624cc28250bf08233bfbd

Mine

Block: # 2

Nonce: 20067

Data: Adi

Prev: 0000ef8d25992abbe67343287c43f8691f00eb3f391624cc28250bf08233bfbd

Hash: 000028efb044019c78d1a0f31f18c2b08f5244f9d6fbc8d731c8d3d549bc5cd

Mine

Block: # 3

Nonce: 16435

Data: Sonu

Prev: 000028efb044019c78d1a0f31f18c2b08f5244f9d6fbc8d731c8d3d549bc5cd

Hash: 000046ffc2201f6e10347492b0bc52c8b30bf4a2eb5f6c3ed

Mine

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

Applied and Action Learning

### Final Output

Block: # 4

Nonce: 55197

Data: Singh

Prev: 00004d6fc2201f6e10347492b0bc52c0b30bf4a2ebe5fdc3edcfe8170969c31d

Hash: 0000618cab676aa268f8cc31d25c1880799a7831fd098c82974f70c0bd01c178

Mine

Block: # 5

Nonce: 23191

Data: AdyashaSingh

Prev: 0000618cab676aa268f8cc31d25c1880799a7831fd098c82974f70c0bd01c178

Hash: 0000257967948fed73588a8726f1b21deafefad503d438246576204eff97e37a

Mine

## \* Observations

- Each block holds transaction data, the time it was created, and the hash value of the block that came before it.
- The process of hashing guarantees that the stored information remains intact and cannot be altered.
- A hash function always produces the same output for the same input, but it is a one-way process — the original input cannot be reconstructed from the hash.
- The overall security of a blockchain relies heavily on the use of cryptographic hashing.

## 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		
<b>Total</b>	<b>50</b>		

**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.*